



US009219797B2

(12) **United States Patent**  
**Lin et al.**

(10) **Patent No.:** **US 9,219,797 B2**  
(45) **Date of Patent:** **\*Dec. 22, 2015**

(54) **METHOD AND SYSTEM FOR A HOSTED MOBILE MANAGEMENT SERVICE ARCHITECTURE**

(75) Inventors: **Daniel J. Lin**, San Francisco, CA (US);  
**Christopher K. Hess**, San Francisco, CA (US)

(73) Assignee: **Amazon Technologies, Inc.**, Reno, NV (US)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.  
This patent is subject to a terminal disclaimer.

(21) Appl. No.: **13/251,598**

(22) Filed: **Oct. 3, 2011**

(65) **Prior Publication Data**

US 2012/0021733 A1 Jan. 26, 2012

**Related U.S. Application Data**

(63) Continuation of application No. 13/035,906, filed on Feb. 25, 2011, now Pat. No. 8,086,226, which is a continuation of application No. 12/783,495, filed on May 19, 2010, now Pat. No. 7,920,856, which is a continuation of application No. 11/674,081, filed on Feb. 12, 2007, now Pat. No. 7,751,807.

(51) **Int. Cl.**  
**H04M 3/00** (2006.01)  
**H04L 29/08** (2006.01)  
(Continued)

(52) **U.S. Cl.**  
CPC ..... **H04L 67/36** (2013.01); **H04L 61/2015** (2013.01); **H04L 67/02** (2013.01);  
(Continued)

(58) **Field of Classification Search**

CPC ..... H04L 67/02; H04L 63/08; H04L 65/403;  
H04L 51/046; H04L 67/141; H04L 67/22;  
H04L 43/04; H04L 67/26; H04L 12/1831;  
H04L 67/306; H04L 2209/42; H04L 2209/80;  
H04L 47/80; H04L 65/80; H04L 67/16  
USPC ..... 455/414.1, 466, 418, 419, 420;  
709/217, 218, 219  
See application file for complete search history.

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

4,622,627 A 11/1986 Rodriguez et al.  
5,544,305 A 8/1996 Ohmaye et al.

(Continued)

**FOREIGN PATENT DOCUMENTS**

CN 101120358 2/2008  
GB 2393349 A 3/2004

(Continued)

**OTHER PUBLICATIONS**

Office Action dated Jul. 30, 2009 in U.S. Appl. No. 11/862,179.

(Continued)

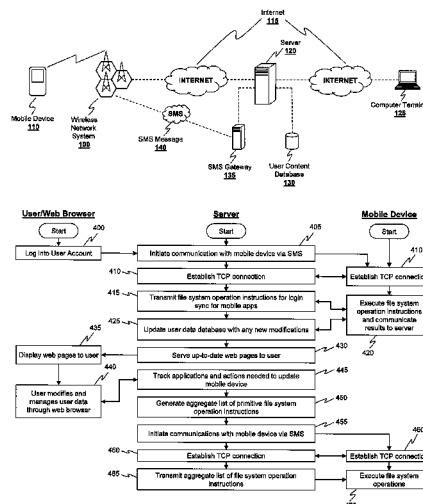
*Primary Examiner* — Nimesh Patel

(74) *Attorney, Agent, or Firm* — Lee & Hayes, PLLC

(57) **ABSTRACT**

A hosted mobile management service is provided for enabling a user to access a centralized account through a user interface on a terminal in order to manage the user's media information, such as digital music and photos. Any modifications made by user through the user interface are transparently sent to the user's mobile device where a module receives such modification information and interacts with the mobile device to reconcile such modifications.

**30 Claims, 7 Drawing Sheets**



(51)	<b>Int. Cl.</b> <b>H04L 29/12</b> <i>H04W 4/00</i> <i>H04W 24/00</i> <i>H04W 76/02</i> <i>H04W 88/02</i>	(2006.01) (2009.01) (2009.01) (2009.01) (2009.01)	6,892,226 B1	5/2005	Tso et al.
			6,904,449 B1	6/2005	Quinones
			6,912,398 B1	6/2005	Domnitz
			6,933,928 B1	8/2005	Lilienthal
			6,938,076 B2	8/2005	Meyer et al.
(52)	<b>U.S. Cl.</b> CPC ..... <b>H04L 67/14</b> (2013.01); <i>H04W 4/00</i> (2013.01); <i>H04W 24/00</i> (2013.01); <i>H04W 76/02</i> (2013.01); <i>H04W 88/02</i> (2013.01)		6,985,932 B1	1/2006	Glaser et al.
			6,999,565 B1	2/2006	Delaney et al.
			7,000,032 B2	2/2006	Kloba et al.
			7,007,015 B1	2/2006	Nayak
			7,009,596 B2	3/2006	Seet et al.
(56)	<b>References Cited</b>  U.S. PATENT DOCUMENTS		7,010,500 B2	3/2006	Aarnio
			7,020,654 B1	3/2006	Najmi
			7,054,914 B2	5/2006	Suzuki et al.
			7,057,591 B1	6/2006	Hautanen et al.
			7,062,707 B1	6/2006	Knauff et al.
			7,092,116 B2	8/2006	Calaway
			7,103,848 B2	9/2006	Barsness et al.
			7,107,533 B2	9/2006	Duncan et al.
			7,130,841 B1	10/2006	Goel et al.
			7,133,506 B1	11/2006	Smith
			7,135,932 B2	11/2006	Quadir et al.
			7,149,776 B1	12/2006	Roy et al.
			7,165,217 B1	1/2007	Kondo
			7,188,085 B2	3/2007	Pelletier
			7,209,888 B2	4/2007	Frid-Nielsen et al.
			7,237,123 B2	6/2007	LeVine et al.
			7,246,118 B2	7/2007	Chastain et al.
			7,249,060 B2	7/2007	Ling
			7,249,324 B2	7/2007	Nakamura et al.
			7,257,577 B2	8/2007	Fagin et al.
			7,287,068 B1	10/2007	Eriksson et al.
			7,290,285 B2	10/2007	McCurdy et al.
			7,298,851 B1	11/2007	Hendricks et al.
			7,304,635 B2	12/2007	Seet et al.
			7,310,629 B1	12/2007	Mendelson et al.
			7,313,759 B2	12/2007	Sinisi
			7,350,704 B2	4/2008	Barsness et al.
			7,355,591 B2	4/2008	Sugimoto
			7,386,480 B2	6/2008	Sarig
			7,398,244 B1	7/2008	Keith
			7,401,286 B1	7/2008	Hendricks et al.
			7,426,398 B2	9/2008	Reisgies
			7,454,238 B2	11/2008	Vinayak et al.
			7,509,270 B1	3/2009	Hendricks et al.
			7,533,152 B2	5/2009	Stark et al.
			7,539,478 B2	5/2009	Herley et al.
			7,562,032 B2	7/2009	Abbosh et al.
			7,567,798 B2	7/2009	Brunel et al.
			7,574,653 B2	8/2009	Croney et al.
			7,631,013 B2	12/2009	Parsons et al.
			7,634,429 B2	12/2009	Narin et al.
			7,656,127 B1	2/2010	Shutt et al.
			7,657,459 B2	2/2010	Anderson et al.
			7,657,831 B2	2/2010	Donahue
			7,680,849 B2	3/2010	Heller et al.
			7,751,807 B2	7/2010	Lin et al.
			7,788,369 B2	8/2010	McAllen et al.
			7,792,756 B2	9/2010	Plastina et al.
			7,835,989 B1	11/2010	Hendricks et al.
			7,865,405 B2	1/2011	Hendricks et al.
			7,865,567 B1	1/2011	Hendricks et al.
			7,908,628 B2	3/2011	Swart et al.
			8,024,400 B2	9/2011	Lin et al.
			2001/0007980 A1	7/2001	Ishibashi et al.
			2001/0025302 A1	9/2001	Suzuki et al.
			2001/0027478 A1	10/2001	Meier et al.
			2001/0037328 A1	11/2001	Pustejovsky et al.
			2001/0049623 A1	12/2001	Aggarwal et al.
			2001/0053975 A1	12/2001	Kurihara
			2002/0002540 A1	1/2002	DeMello et al.
			2002/0010707 A1	1/2002	Chang et al.
			2002/0010759 A1	1/2002	Hitson et al.
			2002/0012134 A1	1/2002	Calaway
			2002/0035697 A1	3/2002	McCurdy et al.
			2002/0054059 A1	5/2002	Schneiderman
			2002/0059415 A1	5/2002	Chang et al.
			2002/0069222 A1	6/2002	McNeely
			2002/0069312 A1	6/2002	Jones
			2002/0071139 A1	6/2002	Janik

(56)

## References Cited

## U.S. PATENT DOCUMENTS

2002/0090934	A1	7/2002	Mitchelmore	2005/0195975	A1	9/2005	Kawakita
2002/0092031	A1	7/2002	Dudkiewicz et al.	2005/0198070	A1	9/2005	Lowry
2002/0101447	A1	8/2002	Carro	2005/0208930	A1	9/2005	Zmrzli
2002/0103809	A1	8/2002	Starzl et al.	2005/0222977	A1	10/2005	Zhou et al.
2002/0120635	A1	8/2002	Joao	2005/0250439	A1	11/2005	Leslie
2002/0123335	A1	9/2002	Luna et al.	2005/0256822	A1	11/2005	Hollingsworth
2002/0123336	A1	9/2002	Kamada	2005/0273470	A1	12/2005	Heigold
2002/0129012	A1	9/2002	Green	2005/0286497	A1	12/2005	Zutaut et al.
2002/0138291	A1	9/2002	Vaidyanathan et al.	2005/0288044	A1	12/2005	Atkins et al.
2002/0143822	A1	10/2002	Brid et al.	2006/0004840	A1	1/2006	Senda
2002/0147724	A1	10/2002	Fries et al.	2006/0015649	A1	1/2006	Zutaut et al.
2002/0184319	A1	12/2002	Willner et al.	2006/0020469	A1	1/2006	Rast
2002/0194474	A1	12/2002	Natsuno et al.	2006/0031316	A1	2/2006	Forstadius
2003/0009459	A1	1/2003	Chastain et al.	2006/0041637	A1	2/2006	Jerrard-Dunne
2003/0018720	A1	1/2003	Chang et al.	2006/0047844	A1	3/2006	Deng
2003/0025731	A1	2/2003	Chastain et al.	2006/0048184	A1	3/2006	Poslinski et al.
2003/0028395	A1	2/2003	Rodgers et al.	2006/0052089	A1	3/2006	Khurana et al.
2003/0040970	A1	2/2003	Miller	2006/0057960	A1	3/2006	Tran
2003/0046233	A1	3/2003	Ara et al.	2006/0061595	A1	3/2006	Goede et al.
2003/0052928	A1	3/2003	Williams	2006/0071754	A1	4/2006	Tofts et al.
2003/0058265	A1	3/2003	Robinson et al.	2006/0075205	A1	4/2006	Martin et al.
2003/0065642	A1	4/2003	Zee	2006/0080261	A1	4/2006	Christal
2003/0069812	A1	4/2003	Yuen et al.	2006/0098900	A1	5/2006	King et al.
2003/0074672	A1	4/2003	Daniels	2006/0123053	A1	6/2006	Scannell
2003/0093312	A1	5/2003	Ukita et al.	2006/0123064	A1	6/2006	Kim et al.
2003/0093382	A1	5/2003	Himeno et al.	2006/0129618	A1	6/2006	Maier
2003/0097354	A1	5/2003	Finlay et al.	2006/0143558	A1	6/2006	Albornoz et al.
2003/0105679	A1	6/2003	Krishnan et al.	2006/0156222	A1	7/2006	Chi et al.
2003/0110503	A1	6/2003	Perkes	2006/0161578	A1	7/2006	Siegel et al.
2003/0129963	A1	7/2003	Nurcahya	2006/0161635	A1	7/2006	Lamkin et al.
2003/0135495	A1	7/2003	Vagnozzi	2006/0175983	A1	8/2006	Crouse et al.
2003/0152894	A1	8/2003	Townshend	2006/0179137	A1	8/2006	Jennings, III et al.
2003/0163399	A1	8/2003	Harper et al.	2006/0190489	A1	8/2006	Vohariwatt et al.
2003/0164844	A1	9/2003	Kravitz et al.	2006/0190568	A1	8/2006	Patterson
2003/0182551	A1	9/2003	Frantz et al.	2006/0236240	A1	10/2006	Lebow
2003/0190145	A1	10/2003	Copperman et al.	2006/0250994	A1	11/2006	Sasaki et al.
2003/0191737	A1	10/2003	Steele et al.	2006/0253441	A1	11/2006	Nelson
2003/0204496	A1	10/2003	Ray et al.	2006/0253461	A1	11/2006	de Bonet
2003/0210789	A1	11/2003	Farnham et al.	2006/0256083	A1	11/2006	Rosenberg
2003/0212613	A1	11/2003	Sarig	2006/0265518	A1	11/2006	Owens et al.
2004/0002943	A1	1/2004	Merrill et al.	2006/0272028	A1	11/2006	Maes
2004/0003398	A1	1/2004	Donian et al.	2006/0281058	A1	12/2006	Mangoaela
2004/0015467	A1	1/2004	Fano	2007/0014404	A1	1/2007	Cha
2004/0030686	A1	2/2004	Cardno et al.	2007/0027857	A1	2/2007	Deng et al.
2004/0044723	A1	3/2004	Bell et al.	2007/0039023	A1	2/2007	Kataoka
2004/0054499	A1	3/2004	Starzyk et al.	2007/0050346	A1	3/2007	Goel et al.
2004/0098350	A1	5/2004	Labrou et al.	2007/0050386	A1	3/2007	Busey
2004/0117189	A1	6/2004	Bennett	2007/0061335	A1	3/2007	Ramer et al.
2004/0120280	A1	6/2004	Western	2007/0073596	A1	3/2007	Alexander et al.
2004/0128359	A1	7/2004	Horvitz et al.	2007/0079383	A1	4/2007	Gopalakrishnan
2004/0139400	A1	7/2004	Allam et al.	2007/0094285	A1	4/2007	Agichtein et al.
2004/0167822	A1	8/2004	Chasen et al.	2007/0094351	A1	4/2007	Kalish et al.
2004/0201633	A1	10/2004	Barsness et al.	2007/0105536	A1	5/2007	Tingo, Jr.
2004/0205457	A1	10/2004	Bent et al.	2007/0112817	A1	5/2007	Danninger
2004/0212941	A1	10/2004	Haas et al.	2007/0118533	A1	5/2007	Ramer et al.
2004/0237033	A1	11/2004	Woolf et al.	2007/0136660	A1	6/2007	Gurcan et al.
2004/0267552	A1	12/2004	Gilliam et al.	2007/0136679	A1	6/2007	Yang
2004/0268253	A1	12/2004	DeMello et al.	2007/0150456	A1	6/2007	Lian et al.
2005/0021464	A1	1/2005	Lindauer et al.	2007/0152980	A1	7/2007	Kocienda et al.
2005/0021611	A1	1/2005	Knapp et al.	2007/0169087	A1	7/2007	Fadell
2005/0022113	A1	1/2005	Hanlon	2007/0174545	A1	7/2007	Okada et al.
2005/0044148	A1	2/2005	Son et al.	2007/0185865	A1	8/2007	Budzik et al.
2005/0044224	A1	2/2005	Jun et al.	2007/0189719	A1	8/2007	Furumachi et al.
2005/0049001	A1	3/2005	Lazaridis	2007/0219983	A1	9/2007	Fish
2005/0066219	A1	3/2005	Hoffman et al.	2007/0233562	A1	10/2007	Lidwell et al.
2005/0069225	A1	3/2005	Schneider et al.	2007/0233692	A1	10/2007	Lisa et al.
2005/0088410	A1	4/2005	Chaudhri	2007/0234209	A1	10/2007	Williams
2005/0102618	A1	5/2005	Naito	2007/0240187	A1	10/2007	Beach et al.
2005/0125222	A1	6/2005	Brown et al.	2007/0250591	A1	10/2007	Milic-Frayling et al.
2005/0138007	A1	6/2005	Amitay	2007/0274505	A1	11/2007	Gupta et al.
2005/0144251	A1	6/2005	Slate	2007/0282809	A1	12/2007	Hoerber et al.
2005/0144895	A1	7/2005	Grimes et al.	2007/0283173	A1	12/2007	Webb et al.
2005/0176438	A1	8/2005	Li	2007/0288853	A1	12/2007	Neil
2005/0177567	A1	8/2005	Hughes et al.	2007/0299913	A1	12/2007	Griffin
2005/0193330	A1	9/2005	Peters	2008/0005097	A1	1/2008	Kleeweine et al.
				2008/0005664	A1	1/2008	Chandra
				2008/0009268	A1	1/2008	Ramer et al.
				2008/0027933	A1	1/2008	Hussam
				2008/0031595	A1	2/2008	Cho

(56)

**References Cited****U.S. PATENT DOCUMENTS**

2008/0040233	A1	2/2008	Wildman et al.
2008/0051071	A1	2/2008	Vishwanathan et al.
2008/0082518	A1	4/2008	Loftesness
2008/0082911	A1	4/2008	Sorotokin et al.
2008/0089665	A1	4/2008	Thambiratnam et al.
2008/0113614	A1	5/2008	Rosenblatt
2008/0120280	A1	5/2008	Iijima et al.
2008/0133479	A1	6/2008	Zelevinsky et al.
2008/0163039	A1	7/2008	Ryan et al.
2008/0164304	A1	7/2008	Narasimhan et al.
2008/0168073	A1	7/2008	Siegel et al.
2008/0208833	A1	8/2008	Basmov
2008/0216153	A1	9/2008	Aaltonen et al.
2008/0222552	A1	9/2008	Batarseh et al.
2008/0243788	A1	10/2008	Reztlaff et al.
2008/0243828	A1	10/2008	Reztlaff et al.
2008/0259057	A1	10/2008	Brons
2008/0293450	A1	11/2008	Ryan et al.
2008/0294674	A1	11/2008	Reztlaff, II et al.
2008/0295039	A1	11/2008	Nguyen et al.
2008/0301228	A1	12/2008	Flavin
2009/0094528	A1	4/2009	Gray et al.
2009/0094540	A1	4/2009	Gray et al.
2009/0228774	A1	9/2009	Matheny et al.
2009/0231233	A1	9/2009	Liberatore
2009/0263777	A1	10/2009	Kohn
2009/0286558	A1	11/2009	Zufi et al.
2009/0318124	A1	12/2009	Haughn
2009/0319482	A1	12/2009	Norlander et al.
2010/0017499	A1	1/2010	Martinent et al.
2010/0023259	A1	1/2010	Krumm et al.
2010/0081120	A1	4/2010	Nanjiani et al.
2011/0099487	A1	4/2011	Pyhalammi et al.
2011/0296315	A1	12/2011	Lin et al.
2012/0021733	A1	1/2012	Lin et al.

**FOREIGN PATENT DOCUMENTS**

JP	2001100702	A	4/2001
JP	2002099739	A	4/2002
WO	WO9720274		6/1997
WO	WO0045588		8/2000
WO	WO0056055	A2	9/2000
WO	WO0075840	A2	12/2000
WO	WO0239206		5/2002
WO	WO2004055647	A2	7/2004
WO	WO2006078728	A2	7/2006

**OTHER PUBLICATIONS**

International Search Report dated Jun. 9, 2008 in counterpart PCT Application No. PCT/US2008/053664.

U.S. Appl. No. 11/277,894, filed Mar. 29, 2006, Jateen P. Parekh, Gregg E. Zehr, and Subram Narasimhan, "Reader Device Content Indexing".

U.S. Appl. No. 11/537,484, filed Sep. 29, 2006, Thomas Ryan, "Expedited Acquisition of a Digital Item Following a Sample Presentation of the Item."

U.S. Appl. No. 11/537,518, filed Sep. 29, 2006, John Lattyak, "Acquisition of an Item based on a Catalog Presentation of Items."

U.S. Appl. No. 11/693,685, filed Mar. 29, 2007, John Lattyak; John Kim; Steven Moy; Laurent An Minh Nguyen, "Relative Progress and Event Indicators."

U.S. Appl. No. 11/763,314, filed Jun. 14, 2007, John Lattyak; Craig Griffin; Steven Weiss, "Display Dependent Markup Language."

U.S. Appl. No. 11/763,339, filed Jun. 14, 2007, David Isbister; Marshall Willilams; Nicholas Vaccaro, "Power Management Techniques for a User Device."

U.S. Appl. No. 11/763,357, filed Jun. 14, 2007, James Reztlaff II; John Lattyak, "Obtaining and Verifying Search Indices."

U.S. Appl. No. 11/763,363, filed Jun. 14, 2007, James Reztlaff II; Thomas Ryan, "Search Results Generation and Sorting."

U.S. Appl. No. 11/763,375, filed Jun. 14, 2007, John Lattyak, Girish Bansil Bajaj, Kevin R. Cheung, Thomas Fruchterman, Robert L. Goodwin, Kenneth P. Kiraly, Richard Moore, Subram Narasimhan, Thomas A. Ryan, Michael V. Rykov, Jon Saxton, James C. Slezak, Beryl Tomay, Aviram Zagorie, Gregg Elliott Zehr, "Delivery of Items for Consumption by a User Device."

U.S. Appl. No. 11/763,376, filed Jun. 14, 2007, Kenneth Kiraly; Thomas Ryan; Gregg Zehr; John Lattyak; Michael Rykov; Girish Bansil Bajaj; James Slezak; Aviram Zagorie; Richard Moore; Kevin Cheung; Thomas Fruchterman; Robert Goodwin, "Notification of a User Device to Perform an Action."

U.S. Appl. No. 11/763,378, filed Jun. 14, 2007, John Lattyak; Thomas Ryan; Gregg Zehr; Kenneth Kiraly; Michael Rykov; Girish Bansil Bajaj; James Slezak; Aviram Zagorie; Richard Moore; Kevin Cheung; Thomas Fruchterman; Robert Goodwin; Xiaotian Guo, "Transfer of Instructions to a User Device."

U.S. Appl. No. 11/763,381, filed Jun. 14, 2007, Michael Rykov; Girish Bansil Bajaj; James Slezak; Aviram Zagorie; Richard Moore; Kevin Cheung; Thomas Fruchterman; Robert Goodwin, "Selecting and Providing Items in a Media Consumption System."

U.S. Appl. No. 11/763,386, filed Jun. 14, 2007, Thomas Ryan; Gregg Zehr; Kenneth Kiraly; John Lattyak; Michael Rykov; Girish Bansil Bajaj; James Slezak; Aviram Zagorie; Richard Moore; Kevin Cheung; Thomas Fruchterman; Robert Goodwin, "Handling of Subscription-Related Issues in a Media Consumption System."

U.S. Appl. No. 11/763,390, filed Jun. 14, 2007, Girish Bansil Bajaj; Michael Rykov; James Slezak; Aviram Zagorie; Richard Moore; Kevin Cheung; Thomas Fruchterman; Robert Goodwin, "Providing User-Supplied Items to a User Device."

U.S. Appl. No. 11/763,392, filed Jun. 14, 2007, Thomas Ryan; Gregg Zehr; Kenneth Kiraly; John Lattyak; Subram Narasimhan; Michael Rykov; Girish Bansil Bajaj; James Slezak; Aviram Zagorie; Richard Moore; Kevin Cheung; Thomas Fruchterman; Robert Goodwin, "Administrative Tasks in a Media Consumption System."

U.S. Appl. No. 11/763,393, filed Jun. 14, 2007, John Lattyak; Michael Rykov; Girish Bansil Bajaj; James Slezak; Aviram Zagorie; Richard Moore; Kevin Cheung; Thomas Fruchterman; Robert Goodwin, "Incremental Updates of Items."

U.S. Appl. No. 11/763,395, filed Jun. 14, 2007, Thomas Ryan; Gregg Zehr; Kenneth Kiraly; John Lattyak; Michael Rykov; Girish Bansil Bajaj; James Slezak; Aviram Zagorie; Richard Moore; Kevin Cheung; Thomas Fruchterman; Robert Goodwin; James Reztlaff II, "Providing Supplemental Information Based on Hints in a Media Consumption System."

U.S. Appl. No. 11/963,618, filed Dec. 21, 2007, Michael Rykov; Laurent An Minh Nguyen; Steven Moy, "Dissemination of Periodical Samples."

U.S. Appl. No. 12/333,215, filed Dec. 11, 2008, Aviram Zagorie; Craig Griffin; John Lattyak; Michael Rykov, "Device-Specific Presentation Control for Electronic Book Reader Devices."

U.S. Appl. No. 12/351,629, filed Jan. 9, 2009, John Johnston; Weiping Dou; Steven Chase, "Antenna Placement on Portable Device."

U.S. Appl. No. 12/351,663, filed Jan. 9, 2009, Chris Li; Steven Chase, "Surface Mount Clip for Routing and Grounding Cables."

U.S. Appl. No. 12/360,089, filed Jan. 26, 2009, Thomas Dimson, Janna Hamaker, Eugene Kalenkovich, Tom Killalea, "Aggregation of Highlights."

U.S. Appl. No. 12/360,744, filed Jan. 27, 2009, Rajiv Kotes Ghanta; Marcos Frid; Joseph J. Hebenstreit; John T. Kim, "Electronic Device With Haptic Feedback."

U.S. Appl. No. 12/366,941, filed Feb. 6, 2009, Scott Dixon; Eriel Thomas, "Bundled Digital Content."

U.S. Appl. No. 12/414,914, filed Mar. 31, 2009, Amit Agarwal; Zaur Kambarov; Tom Killalea, "Questions on Highlighted Passages."

U.S. Appl. No. 29/331,528, filed Jan. 27, 2009, Chris Green, "User Interface Cluster."

"A Universally Unique Identifier (UUID) URN Namespace", Jul. 2005, IETF, 32 pages. Retrieved on Apr. 21, 2010 at <http://tools.ietf.org/pdf/rfc4122.pdf>.

"Annotation Engine," Berkman Center for Internet & Society at Harvard Law School <<http://cyber.iaw.harvard.edu/projects/annotate.html>> [Retrieved Jan. 30, 2004].

## References Cited

"Annotator Instructions," Berkman Center for Internet & Society at Harvard Law School <<<http://cyber.law.harvard.edu/annotate/instructions.html>>>, also found at <<<http://cyber.law.harvard.edu/cite/instructions.html>>>, [Retrieved Jan. 30, 2004].

"Annotator Wishlist," Berkman Center for Internet & Society at Harvard Law School r <[http://cyber.law.harvard.edu/cite/annotate.cgi](http://cyber.law.harvard.edu/cite/annotate.cgi?action=print&markup=center=&view=http%3A%2F%2Fcyber.law.harvard.edu/cite/annotate.cgi?&action=print&markup=center=&view=http%3A%2F%2Fcyber.law.harvard.edu/cite/annotate.cgi)?action=print&markup=center=&view=http%3A%2F%2Fcyber.law.harvard.edu/cite/annotate.cgi>> [Retrieved Jan. 30, 2004].

BarnesandNoble.com, "Barnes and Noble Homepage", retrieved on Aug. 2, 2011 <http://web.archive.org/web/19981202183957/http://www.barnesandnoble.com/>, Dec. 2, 1998.

Beigbeder et al., "An Information Retrieval Model Using the Fuzzy Proximity Degree of Term Occurrences", 2005 ACM Symposium on Applied Computing, pp#1018-pp#1022.

Bellwood, et al., "UDDI Version 2.04 API Specification UDDI Committee Specification, Jul. 19, 2002", Oasis, 95 pages. Retrieved on Apr. 21, 2010 via Wayback Machine at <http://web.archive.org/web/20050314033213/www.oasis-open.org/committees/uddi-spec/doc/tcpspec.htm>.

Roscheisen, M., et al., "Beyond Browsing: Shared Comments, SOAPS, Trails, and On-Line Communities," Computer Networks and ISDN Systems 27:739-749, 1995.

Biskup, J., et al., "Towards a Credential-Based Implementation of Compound Access Control Policies" SACMAT '04, Proceedings of the ninth ACM symposium on Access control models and technologies, Jun. 4, 2004, NY, retrieved from the internet: <http://portal.acm.org/citation.cfm?id=990036.990042> (retrieved Nov. 9, 2010).

Bradley, "Plastic Shape Shifter", retrieved on May 7, 2009 at <<[http://www.reactive-reports.com/61/61\\_3.html](http://www.reactive-reports.com/61/61_3.html)>>, Chemistry WebMagazine, Issue No. 61, Dec. 2006, 2 pgs.

Breu, M. et al., "The Medoc Distributed Electronic Library: Accounting and Security Aspects", Electronic Publishing, New Models and Opportunities, Proceedings of an ICCS/IFIP Conference, Apr. 14, 1997, pp. 237-249.

Canadian Office Action mailed Apr. 14, 2009 for Canadian Patent Application No. 2594573, a counterpart foreign application of U.S. Appl. No. 11/039,645.

Cafesoft.com, "Security Glossary", dated Oct. 13, 2003, retrieved from the Wayback Machine on Jul. 2, 2009 at <<<http://web.archive.org/web/20031013022218/http://cafesoft.com/support/security-glossary.html>>>.

Card et al., "3Book: A 3D Electronic Smart Book", AVI'04 May 25-28, 2004, Hallipoli, Italy, ACM 2004, pp#303-pp#307.

Cavanaugh "EBooks and Accommodations", Teaching Exceptional Children vol. 35 No. 2 p. 56-61 Copyright 2002 CEC.

Cavanaugh, "EBooks and Accommodations", Teaching Exceptional Children, vol. 35, No. 2, Copyright 2002 CEC, 6 pages.

Chi et al. "eBooks with Indexes that Reorganize Conceptually", CHI2004, Apr. 28-29, 2004, Vienna, Austria ACM 1-58113-703-6/04/0004.

Cleveland, Jr. et al., "Questions and Answers about Biological Effects and Potential Hazards of Radiofrequency Electromagnetic Fields" OET Bulletin 56, Fourth Edition, Aug. 1999, 38 pages.

Cleveland, Jr., et al., "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields" OET Bulletin 65, Edition 97-01, Aug. 1997, 84 pages.

Translated Chinese Office Action mailed May 9, 2008 for Chinese Patent Application No. 200680002606.2, a counterpart foreign application of U.S. Appl. No. 11/039,645.

Translated Chinese Second Office Action mailed Jun. 5, 2009 for Chinese Patent Application No. 200680002606.2, a counterpart foreign application of U.S. Appl. No. 11/039,645.

Translated Chinese Third Office Action mailed Nov. 27, 2009 for Chinese Patent Application No. 200680002606.2, a counterpart foreign application of U.S. Appl. No. 11/039,645.

Translated Chinese Office Action mailed Oct. 10, 2011 for Chinese patent application No. 200880017259.X, a counterpart foreign application of U.S. Appl. No. 11/693,682, 7 pages.

Translated Chinese Office Action mailed Jul. 14, 2011 for Japanese patent application No. 20078004873.9, a counterpart foreign application of U.S. Pat. No. 7,865,817, 6 pages.

Translated Chinese Office Action mailed Aug. 25, 2011 for Chinese patent application No. 200880024964.2, a counterpart foreign application of U.S. Appl. No. 11/763,358, 6 pages.

Translated Chinese Office Action mailed Sep. 26, 2011 for Chinese patent application No. 200880017589.9, a counterpart foreign application of U.S. Appl. No. 11/763,369, 9 pages.

Translated Chinese Office Action mailed Sep. 30, 2011 for Chinese patent application No. 200880025056.5, a counterpart foreign application of U.S. Appl. No. 11/763,374, 9 pages.

Davison et al., "The Use of eBooks and Interactive Multimedia, as Alternative Forms of Technical Documentation" SIGDOC'05, Sep. 21-23, 2005, Conventry, United Kingdom, Copyright 2005 ACM 1-59593-175-9/5/0009.

Desmoulins et al., "Pattern-Based Annotations on E-books: From Personal to Shared Didactic Content", Proceedings of the IEEE International Workshop on Wireless and Mobile Techniques in Education, 2002, 4 pages.

Carter, S., et al., "Digital Graffiti: Public Annotation of Multimedia Content," Proceedings of the CHI2004, Vienna, Austria, Apr. 24-29, 2004, pp. 1207-1210.

Elspace, et al., "Portable Haptic Interface with Active Functional Design", In Proceedings SPIE Conference on Smart Structures and Integrated Systems, Newport Beach, California, vol. 3668, Mar. 1999, 926-932.

Extended European Search Report mailed Dec. 22, 2009, issued in corresponding European Patent Application No. EP 06 71 8773.2, filed Jan. 18, 2006, 9 pages.

European Office Action mailed Dec. 12, 2009 for European Patent Application No. 06718773.2, a counterpart foreign application of U.S. Appl. No. 11/039,645, 9 pages.

European Office Action mailed Mar. 26, 2010 for European Patent Application No. 06718773.2, a counterpart foreign application of U.S. Appl. No. 11/039,645.

European Search report mailed Dec. 22, 2009 for European Patent Application No. 06718773.2, a counterpart foreign application of U.S. Appl. No. 11/039,645.

Office Action from the U.S. Patent and Trademark Office for U.S. Appl. No. 11/763,375, mailed Feb. 23, 2010, 15 pages.

Final Office Action for U.S. Appl. No. 11/763,358, mailed on Apr. 5, 2011, James R. Retzlaff II, "Managing Status of Search Index Generation".

Gladney, H. M.: "Access Control for Large Collections", NY, vol. 15, No. 2, Apr. 1, 1997, pp. 154-194.

"Haptic History—Machine Haptics (Expansion)" retrieved on May 7, 2009 at <<[http://haptichistory.chc61.uci.edu/haptic/site/pages/Machine-Haptics-Became\\_5.php](http://haptichistory.chc61.uci.edu/haptic/site/pages/Machine-Haptics-Became_5.php)>> from Google's cache, text-only version as webpage appeared on Apr. 16, 2009, 8 pgs.

Henke, H. "Survey on Electronic Book Features", Open eBook Forum, online, Mar. 20, 2002, pp. 1-14, retrieved from the Internet: <[http://www.openebook.org/doc\\_library/surveys/IDPF\\_eBook\\_Features\\_2002.pdf](http://www.openebook.org/doc_library/surveys/IDPF_eBook_Features_2002.pdf)> retrieved Nov. 8, 2010.

Jones, et al., "Development of a Tactile Vest", IEEE Computer Society, In the Proceedings of the 12th International Symposium on Haptic for Virtual Environment and Teleoperator Systems, Mar. 27-28, 2004, pp. 82-89.

Translated Japanese Office Action mailed Jan. 25, 2011 for Japanese Patent Application No. 2007-552235, a counterpart foreign application of U.S. Appl. No. 11/039,645.

Translated Japanese Office Action mailed Oct. 25, 2011 for Japanese patent application No. 2007-552235, a counterpart foreign application of U.S. Appl. No. 11/039,645, 3 pages.

Leach et al., "A Universally Unique Identifier (UUID) URN Namespace", Jul. 2005, IETF, retrieved on Apr. 21, 2010 at <http://tools.ietf.org/pdf/rfc4122.pdf>, 32 pgs.

Leutwyler, "Shape-shifting Polymer Gels", retrieved on May 7, 2009 at <<<http://www.scientificamerican.com/article.cfm?id=shape-shifting-polymer-ge&print=true>>>, Scientific American, Nov. 9, 2000, 1 pg.

(56)

**References Cited****OTHER PUBLICATIONS**

Means, et al., "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", OET Bulletin 65 Edition 97-01, Jun. 2001, 57 pages.

Mercier et al., "Sphere of influence Model in Information retrieval", IEEE 2005 International Conference on Fuzzy Systems, pp#120-pp#125.

Nakatani, et al., "3D Form Display with Shape Memory Alloy", In Proceedings of 13th International Conference on Artificial Reality and Teleexistence (ICAT), 2003, pp. 179-184.

Navarro, et al., "Modern Information Retrieval, Chapter 8: Indexing and Searching", Jan. 1, 1999, Modern Information Retrieval, ACM Press, New York, pp. 191-228.

Final Office Action for U.S. Appl. No. 11/537,484, mailed on Jan. 24, 2012, Thomas A. Ryan, "Expedited Acquisition of a Digital Item Following a Sample Presentation of the Item", 22 pages.

Final Office Action for U.S. Appl. No. 12/414,914, mailed on Jan. 4, 2012, Agarwal et al., "Questions on Highlighted Passages", 41 pages.

Non-Final Office Action for U.S. Appl. No. 13/207,234, mailed on Jan. 4, 2012, Daniel J. Lin et al., "Method and System for Transferring Content From the Web to Mobile Devices", 10 pages.

Office action for U.S. Appl. No. 12/360,089, mailed on Oct. 5, 2011, Killalea et al., "Aggregation of Highlights", 75 pages.

Final Office Action for U.S. Appl. No. 11/763,392, mailed on Oct. 14, 2011, Thomas Ryan, "Administrative Tasks in a Media Consumption System", 38 pages.

Office action for U.S. Appl. No. 11/763,390, mailed on Oct. 24, 2011, Bajaj et al., "Providing User-Supplied Items to a User Device", 11 pages.

Final Office Action for U.S. Appl. No. 12/759,828, mailed on Nov. 10, 2011, James R. Retzlaff II, "Search and Indexing on a User Device", 16 pages.

Final Office Action for U.S. Appl. No. 11/537,518, mailed on Nov. 25, 2011, John Lattyak, "Acquisition of an Item Based on a Catalog Presentation of Items", 8 pages.

Office action for U.S. Appl. No. 13/620,399, mailed on Nov. 6, 2012, Lint et al., "Method and System for Transferring Content From the Web to Mobile Devices", 11 pages.

Office action for U.S. Appl. No. 13/620,420, mailed on Nov. 6, 2012, Lin et al., "Method and System for Transferring Content From the Web to Mobile Devices", 11 pages.

Non-Final Office Action for U.S. Appl. No. 11/763,386, mailed on Nov. 8, 2011, Thomas Ryan, "Handling of Subscription-Related Issues in a Media Consumption System", 10 pages.

Non-Final Office Action for U.S. Appl. No. 11/763,395, Thomas Ryan, "Providing Supplemental Information Based on Hints in a Media Consumption System", 10 pages.

Office Action for U.S. Appl. No. 11/743,129, mailed on Dec. 20, 2011, Daniel J. Lin et al. "Method and System for Remotely Controlling the Display of Photos in a Digital Picture Frame", 18 pages.

Office action for U.S. Appl. No. 11/763,357, mailed on Dec. 21, 2011, Retzlaff et al., "Obtaining and Verifying Search Indices", 14 pages.

Final Office Action for U.S. Appl. No. 11/763,363, mailed on Dec. 23, 2011, James R. Retzlaff II et al., "Search Results Generation and Sorting", 10 pages.

Non-Final Office Action for U.S. Appl. No. 11/763,369, mailed on Dec. 29, 2011, James R. Retzlaff II et al., "Search of Multiple Content Sources on a User Device", 21 pages.

Final Office Action for U.S. Appl. No. 11/693,685, dated Dec. 8, 2011, John Lattyak et al., "Relative Progress and Event Indicators", 23 pages.

Final Office Action for U.S. Appl. No. 11/763,374, mailed on Feb. 13, 2012, Thomas Ryan et al., "Consumption of Items via a User Device", 14 pages.

Non-Final Office Action for U.S. Appl. No. 11/763,393, mailed on Feb. 16, 2012, John Lattyak et al., "Incremental Updates of Items", 24 pages.

Final Office Action for U.S. Appl. No. 12/360,089, mailed on Mar. 28, 2012, Tom Killalea et al., "Aggregation of Highlights", 17 pages.

Non-Final Office Action for U.S. Appl. No. 12/366,941, mailed on Mar. 30, 2012, Scott Dixon et al., "Bundled Digital Content", 12 pages.

Non-Final Office Action for U.S. Appl. No. 11/537,518, mailed on Apr. 28, 2011.

Office action for U.S. Appl. No. 11/763,357, mailed on May 26, 2011, Retzlaff, "Obtaining and Verifying Search Indices".

Final Office Action for U.S. Appl. No. 11/763,314, mailed on Jun. 13, 2011, Craig S. Griffin, "Display Dependent Markup Language".

Non-Final Office Action for U.S. Appl. No. 11/693,682, mailed on Jun. 9, 2011, Hilliard B. Siegel, "Providing Annotations of a Digital Work".

Office action for U.S. Appl. No. 12/333,215, mailed on Jul. 18, 2011, Zagorie et al., "Device-Specific Presentation Control for Electronic Book Reader Devices", 22 pages.

Non-Final Office Action for U.S. Appl. No. 11/693,685, John Lattyak, "Relative Progress and Event Indicators".

Office action for U.S. Appl. No. 12/414,914, mailed on Aug. 4, 2011, Agarwal et al., "Questions on Highlighted Passages", 39 pages.

Non-final Office Action for U.S. Appl. No. 11/537,484, mailed on Aug. 19, 2011, Thomas A. Ryan, "Expedited Acquisition of a Digital Item Following a Sample Presentation of the Item", 13 pages.

Non-final Office Action for U.S. Appl. No. 11/763,363, mailed on Aug. 26, 2011, James R. Retzlaff II, "Search Results Generation and Sorting", 10 pages.

Office action for U.S. Appl. No. 11/743,129, mailed on Sep. 11, 2012, Lin et al., "Method and System for Remotely Controlling the Display of Photos in a Digital Picture Frame", 20 pages.

Non-Final Office Action for U.S. Appl. No. 11/763,358, mailed on Sep. 12, 2011, James R. Retzlaff II, "Managing Status of Search Index Generation", 11 pages.

Final Office Action for U.S. Appl. No. 11/963,618, mailed on Sep. 26, 2011, Michael Rykov, "Dissemination of Periodical Samples", 15 pages.

Non-Final Office Action for U.S. Appl. No. 11/763,374, mailed on Sep. 27, 2011, Thomas Ryan, "Consumption of Items via a User Device", 17 pages.

OQO "A Full PC That Fits in Your Pocket" Retrieved on Sep. 22, 2008 at <<<http://www.oqo.com/support/documentation.html>>>.

International Search Report mailed Sep. 9, 2008, in International Application No. PCT/US/08/64387, filed May 21, 2008, 1 page.

International Search Report mailed Aug. 15, 2008, in International Application No. PCT/US07/89105, filed Dec. 28, 2007, 2 pages.

International Search Report mailed Aug. 15, 2008, in corresponding International Application No. PCT/US08/57829, filed Mar. 21, 2008, 1 page.

International Search Report mailed Jul. 7, 2008, in International Application No. PCT/US08/57848, filed Mar. 31, 2008, 2 pages.

PCT International Search Report and the Written Opinion for Application No. PCT/US 08/64389, mailed on Jan. 28, 2009, 7 pgs.

PCT Search Report for PCT Application No. PCT/US10/22060, mailed Mar. 8, 2010 (7 pages).

PCT International Search Report and the Written Opinion for Application No. PCT/US2006/001752, mailed on Jul. 27, 2006, 8 pgs.

"Say No To Third Voice," Worldzone.net, 1999-2004, <<http://worldzone.net/internetpixelsnntv/index.html>> [retrieved Jan. 30, 2004].

"Shape Memory Polymer", retrieved on May 7, 2009 at <<[http://en.wikipedia.org/wiki/Shape\\_Memory\\_Polymer](http://en.wikipedia.org/wiki/Shape_Memory_Polymer)>>, Wikipedia, 8 pgs.

Sohn et al. "Development of a Standard Format for eBooks", SAC2002, Madrid, Spain, 2002 ACM 1-58113-445-2/02/0.

"The Berkman Center for Internet & Society at Harvard Law School: Annotation Engine," Harvard.Edu, 1999-2004, <<http://cyber.iaw.harvard.edu/projects/annotate.html>> [Retrieved Jan. 30, 2004], 3 pages.

Marshall, C.C., "The Future of Annotation in a Digital (Paper) World," Proceedings of the 35th Annual GSLIS Clinic, University of Illinois at Urbana-Champaign, Urbana, 11, Mar. 22-24, 1998, pp. 1-19.

Kumar, A., "Third Voice Trails off . . .," Wired News, 2004, <<http://www.wired.com/news/print/O.1294,42803,00.html>> [retrieved Jan. 30, 2004].

(56)

**References Cited**

**OTHER PUBLICATIONS**

"Universal Unique Identifier", dated Dec. 16, 2002. The Open Group, 9 pages. Retrieved on Apr. 21, 2010 via Wayback Machine at <http://web.archive.org/web/20021216070918/http://www.opengroup.org/onlinepubs/9629399/apdxa.htm>.

"Web Services Architecture: W3C Working Group Note Feb. 11, 2004", Feb. 11, 2004, W3C, 100 pages. Retrieved on Apr. 21, 2010 via Wayback Machine at <http://web.archive.org/web/2004040205185/http://www.w3.org/TR/ws-arch/>.

Wellman, et al., "Mechanical Design and Control of a High-Bandwidth Shape Memory Alloy Tactile Display", Springer-Verlag, In the Proceedings of the International Symposium on Experimental Robotics, Barcelona, Spain, Jun. 1997, pp. 56-66, 12 pgs.

Yoshikawa, et al., "Vertical Drive Micro Actuator for Haptic Display Using Shape Memory Alloy Thin Film", IEE Japan, Papers of Technical Meeting on Micromachine and Sensor System, Journal Code L2898B, vol. MSS-05, No. 21-44, 2005, pp. 103-108.

Ziviani, N ED, Baeza-Yates R. et al: "Modern Information Retrieval, Text Operations", January 1, 1999, Modern Information Retrieval, ACM Press, NY, pp. 163-190.

Zobel, J. et al., "Inverted Files for Text Search Engines" ACM Computing Surveys, vol. 38, No. 2, Jul. 1, 2006, pp. 1-56, NY, NY.

Office action for U.S. Appl. No. 13/620,399, mailed on Jun. 18, 2013, Lin et al., "Method and System for Transferring Content From the Web to Mobile Devices", 11 pages.

Office action for U.S. Appl. No. 13/620,420, mailed on Jun. 18, 2013, Lin et al., "Method and System for Transferring Content From the Web to Mobile Devices", 10 pages.

Non-Final Office Action for U.S. Appl. No. 13/620,333, mailed on Feb. 1, 2013, Daniel J. Lin et al., "Method and System for a Hosted Mobile Management Service Architecture", 12 pages.

Office action for U.S. Appl. No. 13/620,261, mailed on Mar. 13, 2013, Lin et al., "Method and System for a Hosted Mobile Management Service Architecture", 24 pages.

Final Office Action for U.S. Appl. No. 13/620,261, mailed on Sep. 24, 2013, Daniel J. Lin, "Method and System for a Hosted Mobile Management Service Architecture", 35 pages.

Office action for U.S. Appl. No. 13/620,399, mailed on Oct. 8, 2013, Lin, et al., "Method and System for Transferring Content From the Web to Mobile Devices", 12 pages.

Office action for U.S. Appl. No. 13/620,420, mailed on Dec. 26, 2013, Lin et al., "Method and System for Transferring Content From the Web to Mobile Devices", 9 pages.

Office Action for U.S. Appl. No. 13/620,261, mailed on Mar. 11, 2014, Daniel J. Lin, "Method and System for a Hosted Mobile Management Service Architecture", 30 pages.

Final Office Action for U.S. Appl. No. 13/620,420, mailed on Apr. 4, 2014, Daniel J. Lin, "Method and System for Transferring Content From the Web to Mobile Devices", 8 pages.

Office action for U.S. Appl. No. 11/743,129, mailed on Jun. 26, 2014, Lin et al., "Method and System for Remotely Controlling the Display of Photos in a Digital Picture Frame", 20 pages.

Office action for U.S. Appl. No. 13/620,399, mailed on Jul. 21, 2014, Lin et al., "Method and System for Transferring Content From the Web to Mobile Devices", 15 pages.

Final Office Action for U.S. Appl. No. 13/620,261, mailed on Aug. 22, 2014, Daniel J. Lin, "Method and System for a Hosted Mobile Management Service Architecture", 35 pages.

Final Office Action for U.S. Appl. No. 11/743,129, mailed on Jan. 15, 2015, Daniel J. Lin, "A Method and System for Remotely Controlling The Display of Photos in a Digital Picture Frame", 22 pages.

Office Action for U.S. Appl. No. 13/620,261, mailed on Jan. 15, 2015, Daniel J. Lin, "Method and System for a Hosted Mobile Management Service Architecture", 30 pages.

Office Action for U.S. Appl. No. 13/620,420, mailed on Mar. 4, 2015, Daniel J. Lin, "Method And System For Transferring Content From The Web To Mobile Devices", 25 pages.

Office Action for U.S. Appl. No. 13/620,399, mailed on Jan. 29, 2015, Daniel J. Lin, "Method And System For Transferring Content From The Web To Mobile Devices", 21 pages.

\* cited by examiner

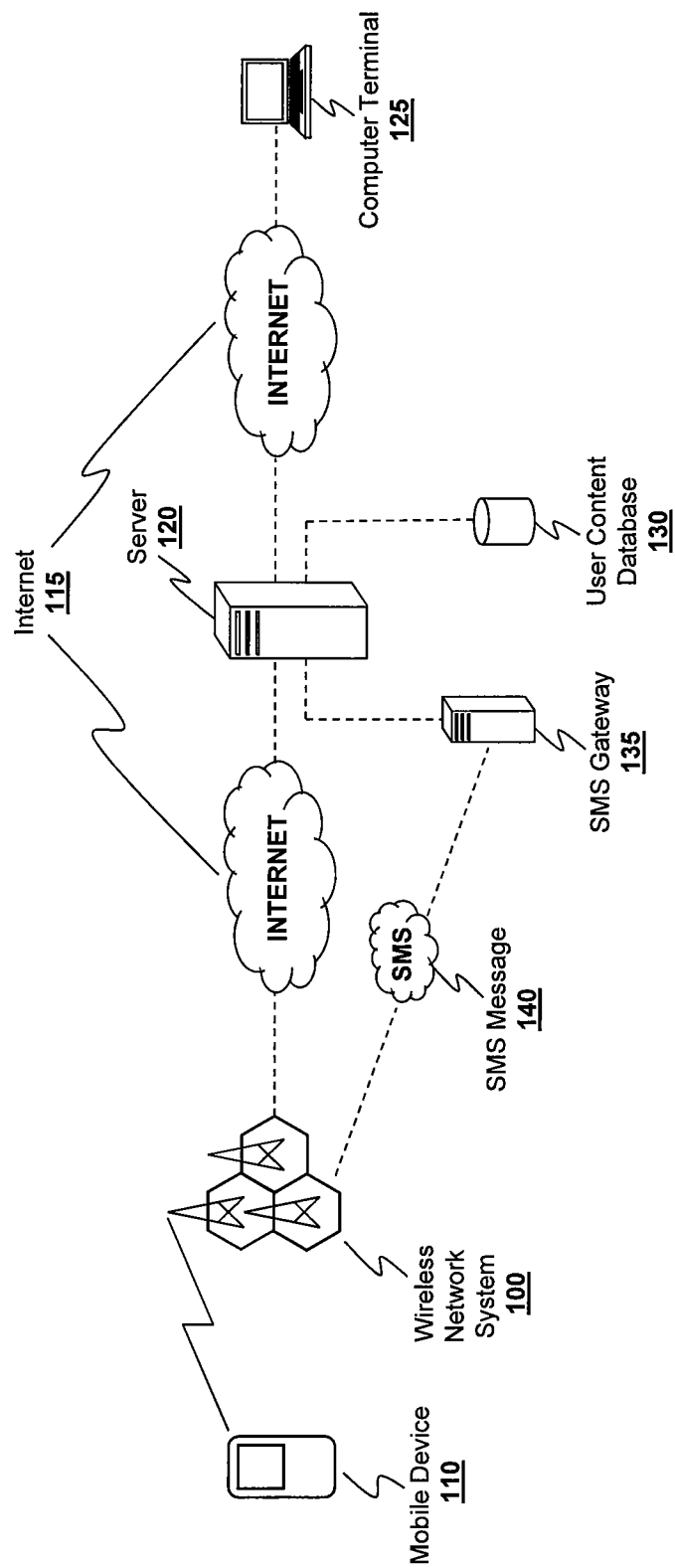


FIGURE 1



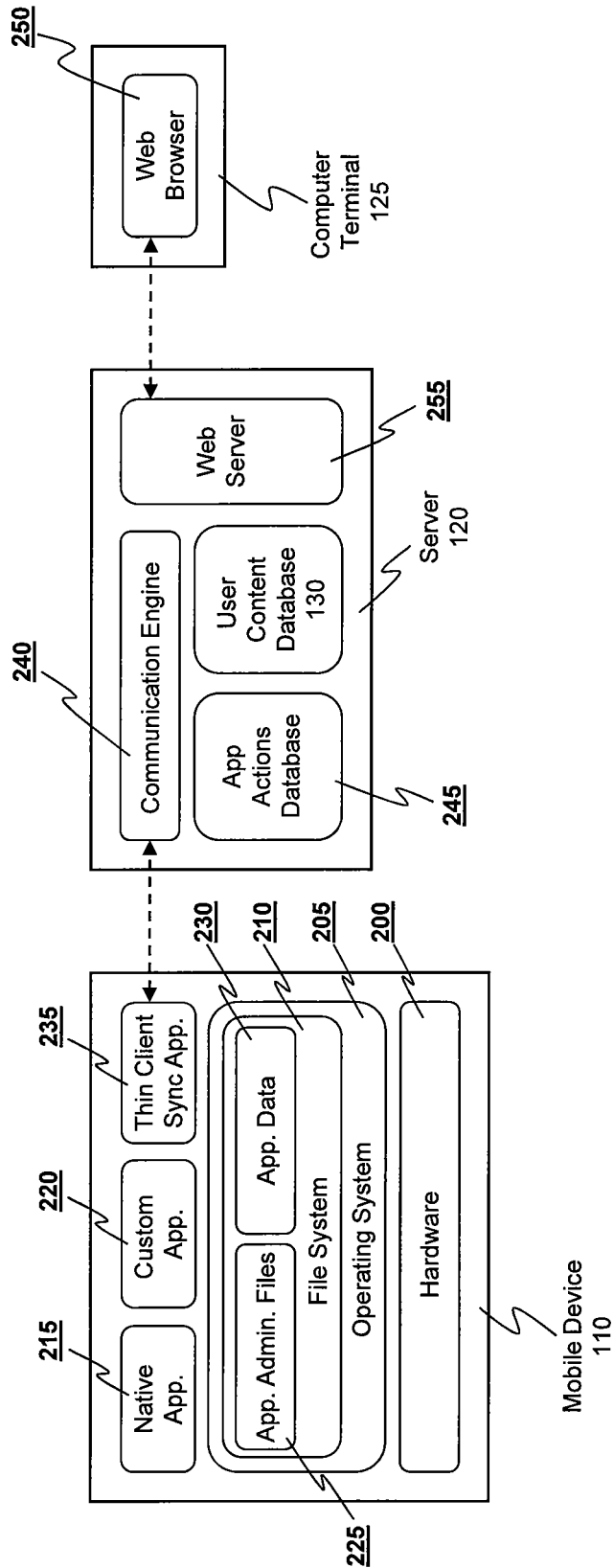
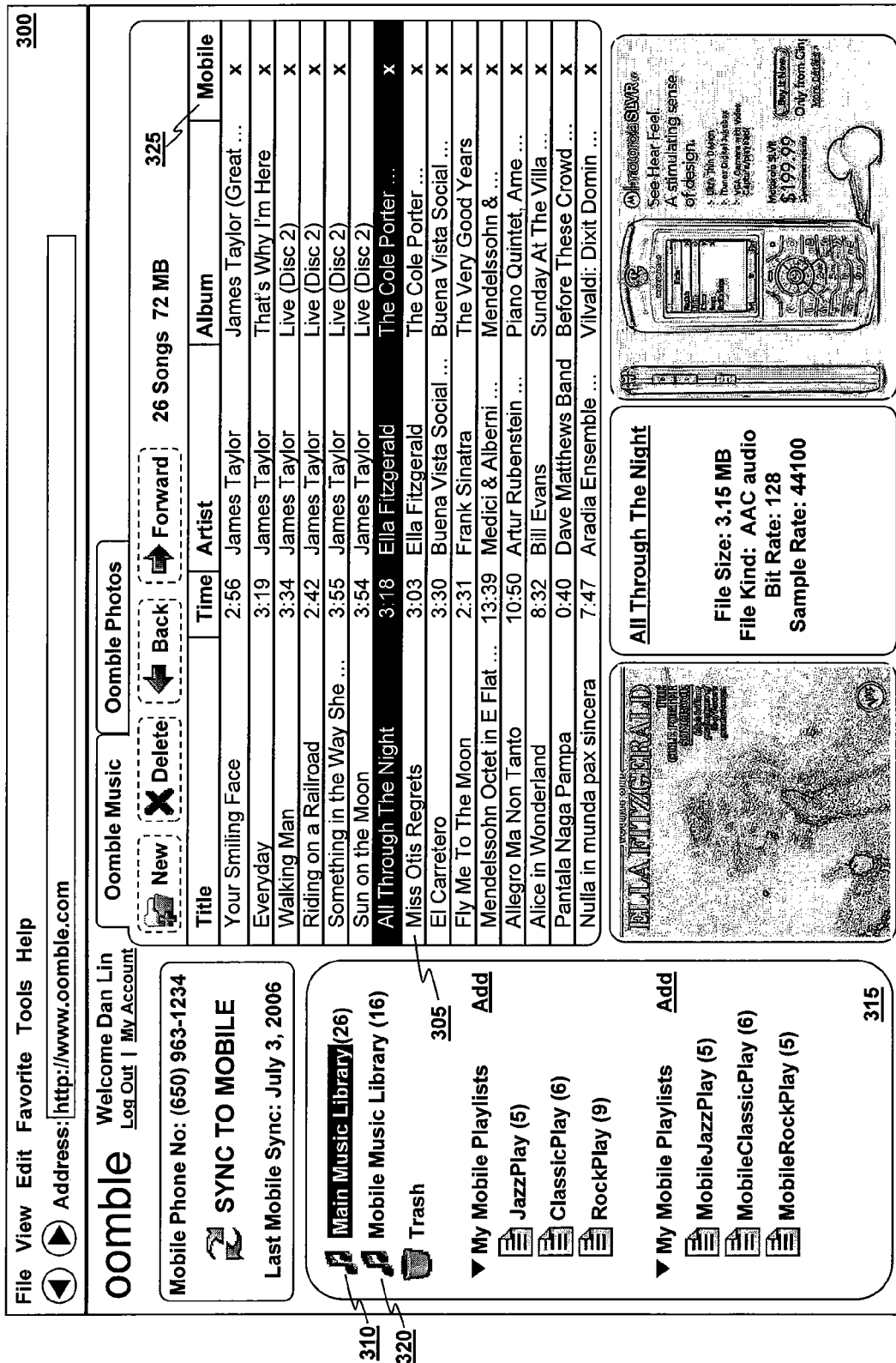


FIGURE 2



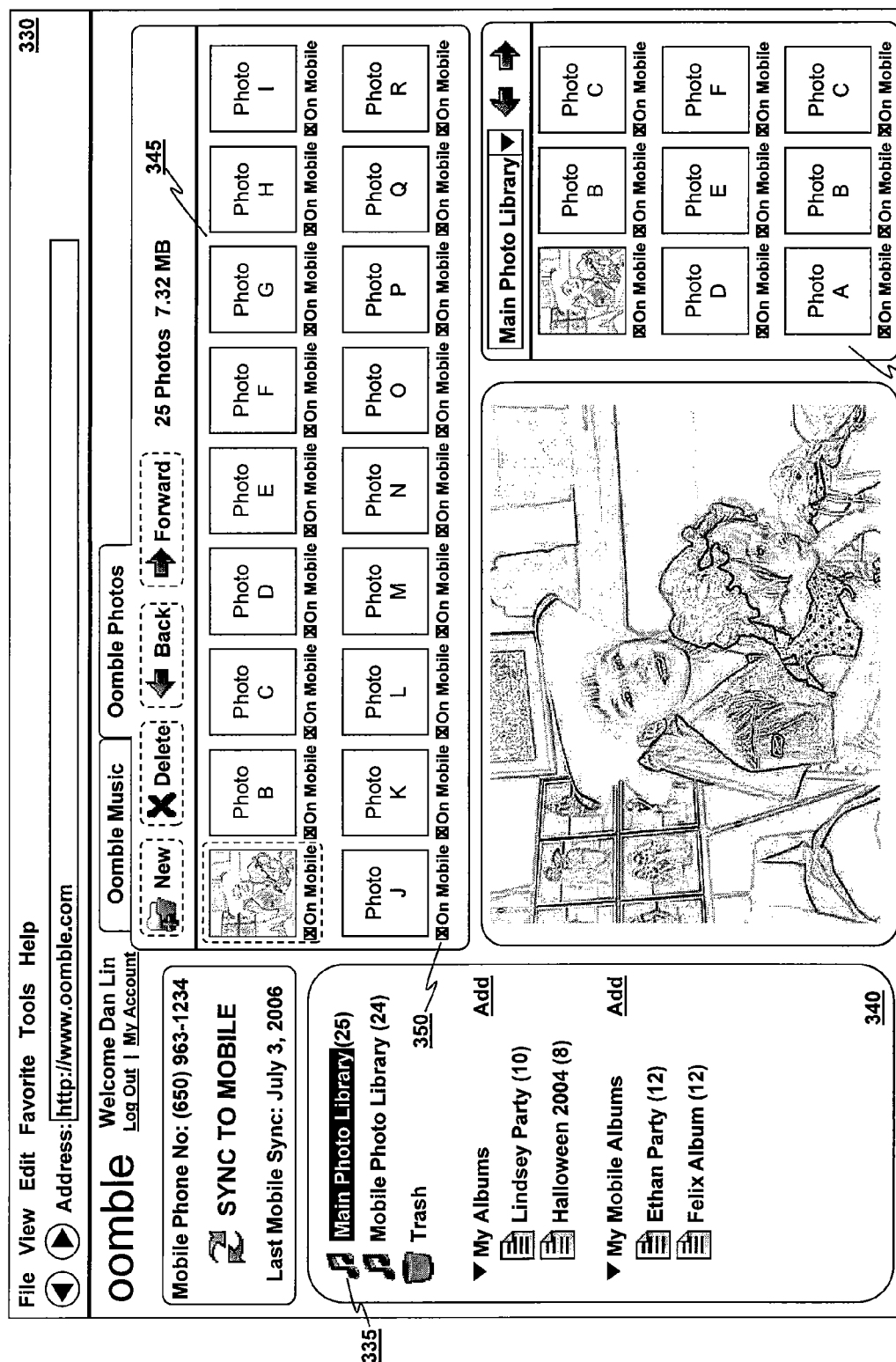


FIGURE 3 (CONT.)

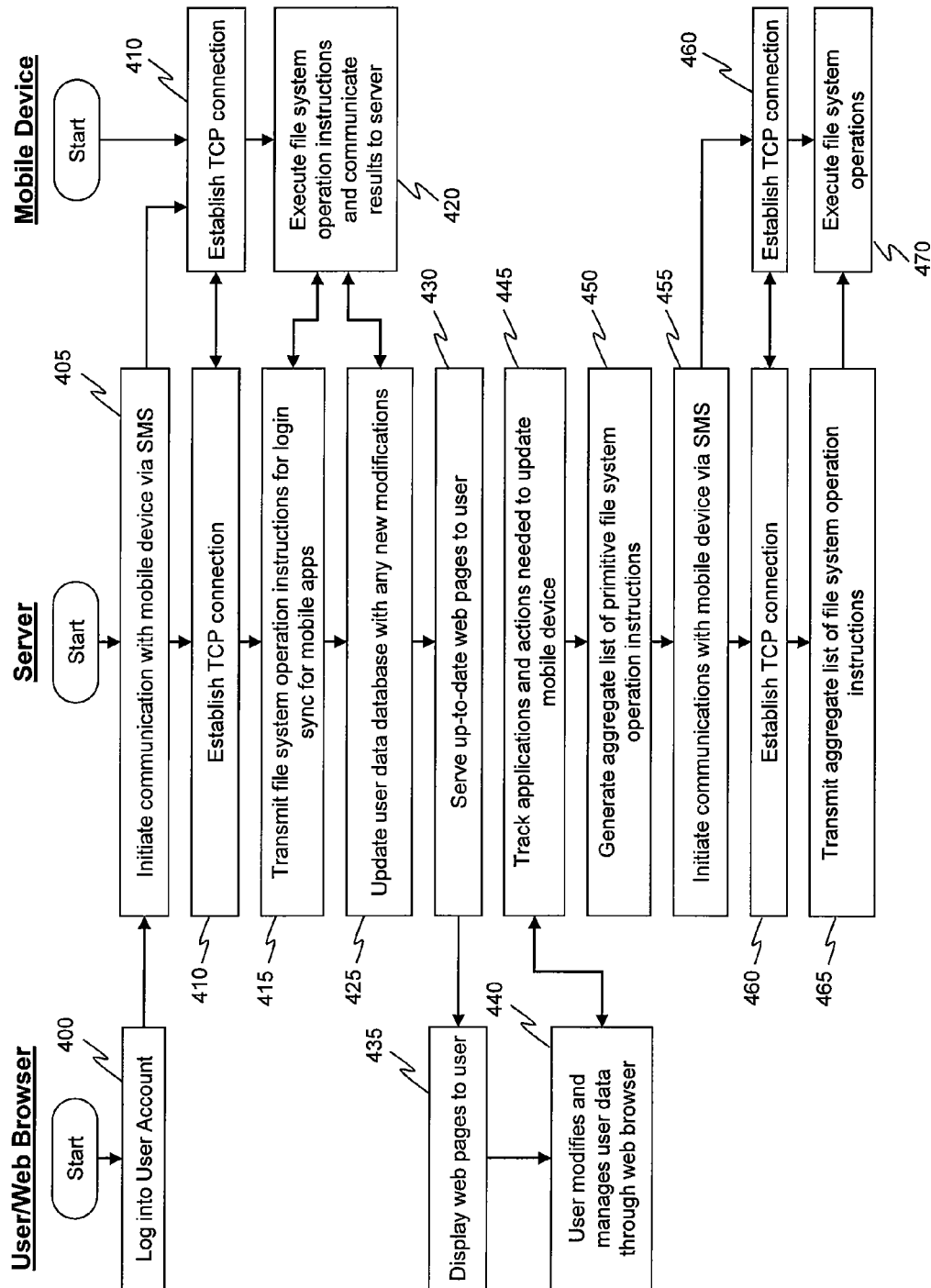


FIGURE 4

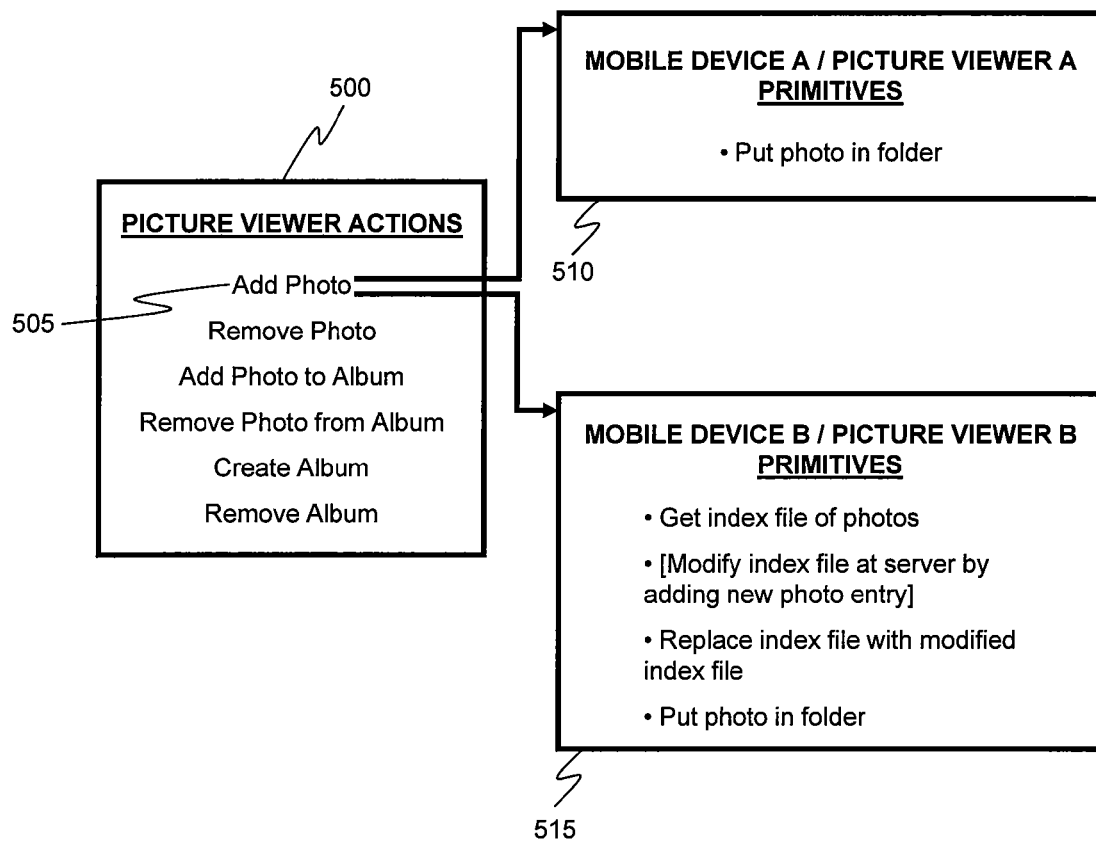


FIGURE 5

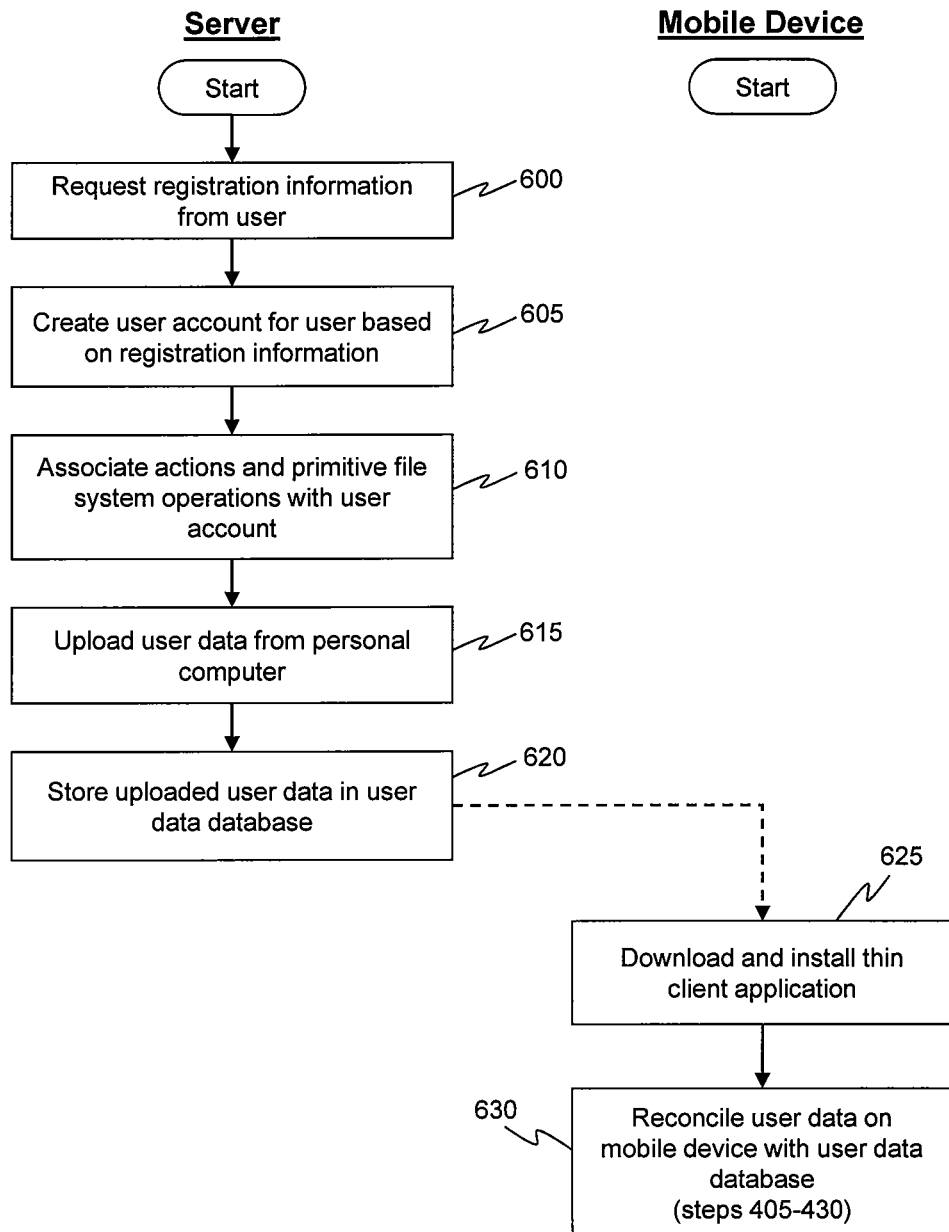


FIGURE 6

# **METHOD AND SYSTEM FOR A HOSTED MOBILE MANAGEMENT SERVICE ARCHITECTURE**

## **CROSS REFERENCE TO RELATED APPLICATIONS**

This application is a continuation of U.S. patent application Ser. No. 13/035,906, filed Feb. 25, 2011, which is a continuation of U.S. patent application Ser. No. 12/783,495, filed May 19, 2010, now U.S. Pat. No. 7,920,856, which is a continuation of U.S. patent application Ser. No. 11/674,081, filed Feb. 12, 2007, now U.S. Pat. No. 7,751,807, all of which are hereby incorporated by reference.

## **FIELD OF THE INVENTION**

The present invention relates generally to an architecture for a hosted mobile management service and, more specifically, techniques for managing media and other content residing on a mobile device with wireless network capabilities.

## **BACKGROUND OF THE INVENTION**

Services and systems currently exist to synchronize certain types of personal data between a user's handheld device, such as a personal digital assistant ("PDA") or smart phone. In the mid 1990s, PDAs such as the PalmPilot by Palm Computing emerged to provide users with the ability to store addresses, phone numbers, email addresses, and personal notes in a small portable device. The PalmPilot would be coupled to a user's desktop PC via a cable in order to synchronize such information with a desktop application provided by Palm Computing to manage and modify such information more easily on the desktop. By the late 1990s, content synchronization services such as AvantGo began to appear to provide PDA owners with the capability to receive updated feeds from content providers (e.g., American Airlines, CNET, GM, Rolling Stone, The New York Times, etc.) via the Internet through a synchronization process whereby the PDA owner would connect his PDA, which had an installed PDA application to view content, to his PC, which also had an installed "conduit" application to download content from the content providers' web sites. In 1999, Research In Motion ("RIM") introduced the Blackberry, a wireless email portable device that solved the "two mailbox" problem (having a wireless email mailbox and a corporate email mailbox). A corporation supporting the Blackberry email synchronization system would install a proprietary RIM messaging server to interact with the corporation's own email system. The proprietary RIM messaging server situated at the corporation would interact with RIM's own proprietary remote messaging center server which would then relay corporate emails to the user's wireless provider, which would in turn deliver or push the emails to a user's Blackberry device. As such, emails addressed to a user's corporate email address would transparently appear on the user's Blackberry device in real-time without the need to manually synchronize in a manner similar to the prior PDA synchronization solutions discussed.

More recently, services such as Mobical and Yahoo! Mobile have utilized the SyncML open standard protocol promulgated by the Open Mobile Alliance to enable the transfer and synchronization of data between SyncML compliant native applications on the cell phone (e.g., phonebook, address book, contacts, etc.) and a SyncML compliant server over the cellular network (e.g., GPRS, 2.5G, 3G, 3.5G, etc.). Such a SyncML compliant server may also provide an online

web environment for the user to view and modify such data. Similar to the prior PDA synchronization solutions (other than the Blackberry email push methods), many SyncML services typically focus on cell phone initiated manual synchronization. The user typically registers for a service by providing the SyncML application residing on the cell phone a username, password, server address and data paths for each native application function to coordinate synchronization. When the cell phone user desires to synchronize between the server and his phone, he navigates to the SyncML application and manually instructs the cell phone to initiate synchronization with the server. The SyncML registration process and the manual synchronization process can prove to be inconvenient and difficult to set up or use given the small size of the keypad (e.g., to type in registration information) and the time needed to navigate through the cell phones various menus. Most recently, Yahoo! Go Mobile introduced the capability to synchronize a user's emails and photos as well as the user's contacts and calendar managed at the Yahoo! Web site portal with the user's cell phone native applications. A Yahoo! mobile application is installed on the user's cell phone and appears as a separate application that can be launched from the cell phone's main menu. When the user launches the Yahoo! application on the cell phone, a Yahoo! submenu is presented to the user to provide access to the user's emails, contacts, calendar and photos. Running transparently in the background, the Yahoo! application on the cell phone polls a Yahoo! server (via the wireless network) to determine whether updates should be pulled from the user's Yahoo! account in the Yahoo! server into the cell phone.

With the continued convergence of portable devices functionally designed for personal information management ("PIM") such as PDAs with voice and other communication oriented portable devices such as the cell phone (any such wireless networked portable devices shall hereinafter be referred to herein as a "cell phone"), Mobical and the various Yahoo! services demonstrate that the industry is moving towards a single wireless networked portable device that can be transparently synchronized with a web site where a user's personal information may be more easily managed due to the availability of a larger screen and navigation tools, such as a keyboard, mouse and sophisticated graphical user interfaces ("GUI"). However, the inconvenience of cell phone initiated manual synchronization techniques currently available through Mobical and Yahoo! continue to inhibit the wider adoption of such hosted mobile management services. Furthermore, use of open standard synchronization protocols such as SyncML require application developers to have knowledge of the synchronization protocol in order to develop specific synchronizing components (or plug-ins) for synchronization protocol compliant applications. For example, SyncML requires local applications to record the changes to data made by the user so that such changes can later be transmitted to remote servers or devices for synchronization. SyncML makes use of a "change log", a local database that stores changes made by the user within a local application (e.g., adding or removing a contact). When the application data is synchronized with a remote server or device, those changes are sent to the remote server or device and applied to a remote copy of the application data. However, there exist many mobile applications that have been built without consideration of a change log, either to simplify the development effort or because the mobile application developers did not have the intention or forethought of synchronizing data. Many of these applications could benefit from allowing the data they store locally to be synchronized so that the data (1) could be backed-up or stored on a server, and (2)

3

could be managed on a server where the user interface is more convenient and then have those changes synchronized back to the local application.

While there currently do exist non-SyncML synchronization mobile solutions, such solutions generally either (1) offer their own proprietary user-facing application on the cell phone with a "rich" user interface, or (2) require application developers to develop mobile applications that interface with a proprietary synchronization platform (i.e., through proprietary APIs, etc.). For example, PixSense, a company that enables a user to immediately upload digital photos taken from a user's cell phone camera to the PixSense website, requires the user to download and install a proprietary PixSense user facing application onto the cell phone through which the user must interact in order to manage and send photos to the PixSense website. Sharpcast is another recent company that offers a proprietary platform that enables independent software developers to utilize proprietary Sharpcast APIs during the software application development process to provide synchronization related capabilities between mobile devices, desktop applications and web services. What is needed is a synchronization architecture that enables a user to add, remove and otherwise manage content such as multimedia data (e.g., music, photos, video, ringtones, images, etc.) from the web to the phone (as opposed to an architecture that may require manual initiation of synchronization via the cell phone). Such an architecture should not require independent cell phone application developers to understand or write to either proprietary or standard synchronization APIs such that both pre-existing applications such as the native applications on the cell phone and newly developed applications can benefit from the architecture.

#### SUMMARY OF THE INVENTION

The present invention provides a method for providing a user a user interface to manage a mobile device. Such a method comprises: (1) recording an action taken by the user on the user interface at a terminal separate from the mobile device, (2) transmitting a push message to the mobile device to trigger execution of the action by a module on the mobile device, wherein the module is registered to automatically execute upon receipt of the push message, (3) receiving a request from the module to establish a network connection upon automatic execution of the module after receipt of the push message; and (4) communicating with the mobile device regarding the action through an established network connection.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 depicts an embodiment of an infrastructure environment in which the present invention may be deployed.

FIG. 2 depicts an embodiment of a component architecture of the mobile device and server in accordance with the present invention.

FIG. 3 depicts an embodiment of web pages served by the web server of the hosted mobile management server to the user's web browser.

FIG. 4 depicts a flow chart detailing the communication protocol among the mobile device, server and user's web browser in accordance with the present invention.

FIG. 5 depicts a list of actions for a picture viewing application and the file system operations that may be associated with such actions.

4

FIG. 6 depicts a flow chart for enrolling an end user in a hosted mobile management service in accordance with the present invention.

#### DETAILED DESCRIPTION OF THE INVENTION

##### A. Infrastructure Environment

FIG. 1 depicts one embodiment of an infrastructure environment in which to deploy the present invention. An underlying digital cellular wireless network system **100** in this environment may be a 3.5G network such as HSDPA/UMTS (High Speed Downlink Packet Access/Universal Mobile Telephone System). Other possible digital cellular wireless network systems would include, without limitation, all other forms of 2.5G (e.g., GPRS, EDGE, etc.), 3G (e.g., TD-SCDMA, CDMA2000, etc.), 3.5G and future generations of packet-switched cellular wireless technologies. Because the underlying digital cellular wireless network system **100** supports packet-switching capability, it is able to implement an IP-based network that supports TCP/IP based communications by mobile device **110**. A current commercial example of a mobile device (e.g., smartphone, PDA handheld, etc.) that might be used in accordance with the present invention could be Motorola's SLVR cell phone which supports cellular communication technologies and includes an embedded iTunes digital music player application from Apple Computer. Additionally, the digital cellular wireless network system **100** also supports text messaging services such as SMS (Short Message Service) **140**. The digital cellular wireless network system **100** may also provide the mobile device **110** access to the Internet **115** through its IP-based network capabilities.

By obtaining an IP address from the underlying digital wireless network system **100**, the mobile device **110** is able to communicate through the digital cellular wireless network system **100** through the Internet **115** and ultimately to a server **120** that hosts a mobile management service in accordance with the present invention. In addition to communicating with the mobile device **110**, such a hosted mobile management server **120** may also serve web pages to an end user using an Internet connected terminal with a web browser such as **125** (e.g., laptop, personal computer, etc.) in order to provide access to the user's personal account on the server **120**. The server **120** may also be coupled to a user content database **130** in order to store user content (e.g., videos, digital photos, music files, games, ringtones, images, PIM information, other media files, etc.) at a centrally accessible location and an SMS gateway **135** in order to send SMS messages to the mobile device **110**. As used hereinafter, the term and reference number "server **120**" may be used generally to refer to the server side capabilities (as opposed to the client side capabilities) and therefore may include functionality resident in the database **130** and SMS gateway **135** as the context requires.

##### B. Component Architecture

FIG. 2 depicts a component architecture of the mobile device **110** and the server **120** in accordance with the present invention. In a typical mobile device **110**, on top of the hardware layer **200** lies an operating system layer **205** that contains a file system sub-layer **210**. Applications residing on the mobile device **110** whether native applications **215** or custom applications **220** that are subsequently downloaded onto the mobile device **110** interact with the file system **210** by storing application specific administration files **225** such as index



5

files to keep track of user configurations, default settings, data organization, etc. and application specific data files 230 such as songs and photos. The present invention envisions a thin client application 235 that is installed onto the mobile device 110 in order to execute instructions received from the server 120. The thin client application 235 interacts with the mobile device 110 at the file system layer 210 by adding to, removing from, or otherwise modifying the contents of the application specific administration files 225 and the application specific data files 230. Upon the thin client application's completion of instructions received from server 120, launching of the native applications 215 and custom applications 220 will benefit from the modifications made by the thin client application 235 to the underlying administration files 225 and data files 230 for such applications (e.g., view new photos added to the application specific data files 230 for the native photo viewer application, listen to a new song added to an existing playlist described in the index file that is an administration file 225 for the native music player application, etc.).

In one embodiment, the thin client application 235 continuously runs in the background and listens for SMS messages sent from the server 120 to the mobile device 110 through the SMS gateway 135. In alternative embodiments, the thin client application 235 may register itself to receive notification from the underlying mobile device operating system 205 that SMS messages intended for it have arrived (e.g., sometimes referred to as the "push registry" of the mobile device operating system). When such SMS messages arrive, the operating system 205 then launches the thin client application 235 to consume the SMS message. As previously discussed, the thin client application 235 may primarily be a passive application that interacts with the file system 210 of the mobile device 110 only after receiving specific instructions from the server 120. In particular, a communications engine component 240 of the server 120 may transmit such instructions to the thin client application 235 in response to actions (e.g., moving new photos into a mobile photo library, deleting a song from a mobile playlist, etc.) taken by the user to manage his data through the server's 120 web site that is hosted by the web server 255 and accessed through web pages served to the user's web browser 250. In order to determine the file system operations to be performed by the thin client application 235 that correspond to the user's data management actions on the web site, the communications engine 240 may query an application actions database 245. For each mobile application supported by the server 120, the application actions database 245 may maintain an ordered list of file system operation instructions (e.g., put a file/folder, get file/folder timestamp, get a file/folder size, add a file, delete a file/folder, replace a file/folder, copy a file, move a file/folder, rename file/folder, etc.) for each action (e.g., add a photo, remove a photo, add a photo to an album, add an album, etc.) that may be performed by such mobile application (or proxied by actions made by the user on the server's web site).

As an example of the foregoing discussion, in order to remove a song from a mobile playlist, the user may use the server's web site to drag and drop the song from the mobile playlist into a "trash" icon. Such an action by the user triggers the web browser 250 to communicate the action to the web server 255 which, in turn, communicates the action to the communications engine 240. The communications engine 240 may then query the application actions database 245 to determine the type, order and number of file system operations needed to remove the song from the actual mobile playlist residing on the mobile device 110. The application actions database 245 may respond to the communications engine 240 with the following file system operation instruc-

6

tions: (1) obtain the index file used by the music playing application (i.e., an administration file 225 for the music player application), and (2) rewrite a modified index file (as modified by the communications engine 250 after parsing the received index file from the thin client application 235 and making the appropriate changes to it) to the file system 210 with the song removed from the playlist. In turn, the communications engine 240 may then transmit the instructions to the thin client application 235 to carry out such file system operations on the mobile phone 110.

Similarly, other data management actions taken by the user through the web browser 250 may require additional user content residing in the user content database 130 to be transmitted to the mobile device 110. In particular, user content database 130 may provide users central storage space for their multimedia data such as videos, songs, digital photos, wall-paper images, ringtones, etc. User content database 130 may also store user account information for the server 120 such as the user's mobile phone number, the make and model of the mobile device 110 and the types of applications (native and/or custom) on the mobile device 110. The web pages served by web server 255 to web browser 250 may then be used as an interface for the user to easily manage and keep track of such multimedia data and move such multimedia data on and off the mobile device 110 in a single aggregate web session. Multimedia data can be added and stored in the user content database 130, for example, by uploading content that resides on the user's laptop 125 or personal computer (e.g., digital photos taken by the user's digital camera, e-commerce purchases of multimedia data conducted through services other than web server 255, etc.), by transferring content purchased by the user through e-commerce capabilities offered directly though the server's web site and then added directly to the user content database 130, or by uploading content generated by or purchased through the mobile device 110 and transferred to the server 120 (e.g., a digital photo taken by the digital camera of the mobile device 110). The user may, for example, drag and drop a digital photo stored in user content database 130 into his mobile photo library in order to add the digital photo to his mobile device 110. As previously described, such an action is relayed to the web server 255 and then to the communications engine 240, which then extracts the desired digital photo from the user content database 130 and queries the application actions database 245 for the proper file system operation instructions to add the desired digital photo to the mobile device 110 in a manner accessible by the picture viewing application on the mobile device 110 (whether a native application 215 or custom application 220). Once the communications engine 240 receives the list of file system operation instructions from the application actions database 245, it instructs the thin client application 235 to execute such operations on the file system 210 of the mobile device 110.

Those with ordinary skill in the art will recognize that the logical components set forth in FIG. 2 are merely exemplary and that other components and configurations that provide substantially similar functionality to that of the logical components in FIG. 2 can be used consistent with the spirit and scope of the invention. For example, while communications engine 240 is set logically apart from the web server 255 in FIG. 2, those with ordinary skill in the art will recognize that such separation is for logical discussion purposes only and that actual code implementations of the foregoing may not necessarily utilize such logical distinctions. In one exemplary configuration, web server 255 components containing the web server functionality described herein, the communications engine 240 and other capabilities described in the fore-

7

going may be implemented as Java servlets that interact with a web server supporting servlet technology such as Apache Tomcat. Similarly, while the application actions database **245** and the user content database **130** are described as separate logical databases, those with ordinary skill in the art will also recognize that such databases may utilize the same underlying database platform or technology (e.g., MySQL, etc.) or may be implemented programmatically through data that is statically embedded in various source code files.

### C. User Interface

FIG. 3 depicts one embodiment of certain web pages that may be served by the web server **255** of the hosted mobile management server **120** to the web browser **250** to provide the user the ability to view the data residing on both the server **120** and on the mobile device **110**. For example, the web browser view **300** depicts a user interface for music. Main panel **305** provides a view of all the songs that the user has stored in the user content database **130**. Correspondingly, the “Main Music Library” selection of the navigational panel **315** has been highlighted. Below the “Main Music Library” selection is a “Mobile Music Library” **320** selection which, if selected, would modify the contents of main panel **305** such that only those songs that also are stored in the mobile device **110** (as application data **230**) are displayed. As shown in FIG. 3, such songs are also indicated by the mobile indicator column **325**. To manage his songs, the user may easily drag and drop songs displayed in main panel **305** into libraries, playlists or the trash icon as set forth in navigational panel **315**. As previously described, such actions taken by the user on web browser view **300** may trigger actions that are communicated by communications engine **240** to the mobile device **110**.

Web browser view **330** similarly depicts a user interface for photos. Because the “Main Photo Library” selection **335** is highlighted in the navigational panel **340**, the main panel **345** depicts thumbnails of all the photos store on the server **120** for the user. Main panel **345** also displays below each thumbnail a mobile indicator **350** to display which photos are also stored on the mobile device **110**. Similar to the web browser view for music **300**, the user may easily drag and drop photo from the main panel **345** into the secondary panel **355** (or vice versa) or navigational panel **340** to manage the photos on the server **120** and mobile device **110**.

In one embodiment, changes to data made by the user through the web browser **250** are captured and tracked in the aggregate by the web server **255** until the user completes his session, whereby the communications engine **240** communicates with the thin client application **235** to propagate the relevant changes to the mobile device **110**. In alternative embodiments, each separate change made by the user in real time may trigger a separate communication between the communications engine **240** and the thin client application **235** to propagate the change to the mobile device **110**.

Those with ordinary skill in the art will recognize that FIG. 3 is merely exemplary of numerous ways to display user data stored on the server **120** and mobile device **110** that remain consistent with the spirit and scope of the present invention. For example, while FIG. 3 only depicts user interfaces for music and photos, those with ordinary skill in the art will recognize that other types of user data can be similarly stored, managed and viewed including videos, ringtones, images, games, wallpaper and PIM data. In addition to a variety of other types of user data that can be managed and displayed to the user through the server’s web site, other types of user interface designs may also be envisioned that would be consistent with the scope of the present invention. For example,

8

rather than utilizing web views such as **300** and **330** that are similar to standard email user interfaces (such as Outlook, Yahoo! Mail, etc.), a user interface that simulates the make and model of the user’s mobile device may also be used. In such an interface, by dragging and dropping available user data such as wallpaper and ringtones into the mobile device simulator, the user may be able to immediately view and hear his modifications on the displayed mobile device simulator prior to synchronizing with the actual mobile device **110**. Furthermore, the server’s **120** web site may also integrate functionality and/or interact with other online service providers such as online music stores and photo sharing sites to enable sharing of user data and the purchase of new user data that is immediately stored in user content database **130**.

### D. Communication Protocol

FIG. 4 depicts a communication protocol among mobile device **110**, server **120**, and the user during a data management session conducted by the user through the server’s **120** web site. Initially, the user logs into his user account on the server’s **120** web site through the web browser **250** (step **400**). Due to the user’s prior enrollment or registration with the server **120**, the server **120**, by accessing the user’s account data in user content database **130**, may have knowledge of the user’s mobile phone number, the make and model of the mobile device **110** and the types of applications (native and/or custom) on the mobile device **110**. Through the information stored in the application actions database **245**, server **120** may also have knowledge of the file system operations used by such applications to interact with the file system **210** (e.g., where administration files and data files are located in the file system **210** and what format they take, etc.). For example, certain picture viewing applications on certain mobile devices may utilize an index file to keep track of the photos accessible by the application while other picture viewing applications may simply use the folder structure of the file system itself **210** to keep track of the photos. Upon the user’s login, web server **225** instructs the communications engine **240** to initiate communication with the mobile device **110** (step **405**). In one embodiment, such initiation occurs by transmitting an SMS message via the SMS gateway **135** to an SMS port number on which the thin client application **235** is listening. The SMS message may include the IP address of the server **120** and a session identifier (e.g., session number) used by the server **120** to keep track of the particular communication session between it and the thin client application **235**. As previously discussed, depending upon the embodiment, for example, upon receiving the SMS message, the thin client application **235** may either be launched by the mobile device’s **110** push registry or may directly receive the SMS message as a continually running background application that listens for messages on the specified SMS port. The thin client application **235** may then extract the IP address of the server **120** from the SMS message and establish a TCP connection with the server **120** by connecting to the IP address and identifying itself through the session identifier (step **410**). Those with ordinary skill in the art will recognize that other types of network communication protocols other than TCP may be used without departing from the spirit of the invention including HTTP and other IP based network protocols. Similarly, out of band channels other than SMS may be utilized in step **405**.

Once a network connection is established between the thin client application **235** and the server **120**, the communications engine **240** identifies the various supported applications on the user’s mobile device **110** by querying the user content

database 130. The communications engine 240 may then extract various file system operation instructions from the application actions database 120 for such applications and may then direct the thin client application 235 to perform such file system operations to assess whether file system folders and/or files used by the various supported applications on the mobile device 110 have been modified since the user's last login to the server 120 (e.g., the user may have taken and saved a new photo through the mobile device's own camera or may have deleted a song from a mobile playlist using the mobile device's keypad) (step 415). For example, for a particular picture viewer for a particular mobile device, the communications engine 240 may request that the thin client application 235 transmit the timestamp of the file system folder (i.e., a file system operation) that stores the photos accessed by the picture viewer of the mobile device 110. If the timestamp of the folder differs from the date known by the server 120 as the last date upon which the contents of the folder were modified, then the server 120 may recognize that the user may have made modifications to the folder subsequent to the user's last login with the server 120. In such instance, the communications engine 240 may additionally request the thin client application 235 to transmit a directory listing of the folder in order to assess what new photos were added (and subsequently download such new photos to the server 120 for storage in the user content database 130) or old photos removed. In similar fashion, if a music application uses an index file to internally manage which music files are used by the application and their locations, the communications engine 240 may request that the thin client application 235 transmit the timestamp for the index file used by the mobile device's 110 music player for keeping track of the songs and playlists on the mobile device 110 to assess whether modifications had been made since the user's last login to the server 120 (and take subsequent reconciliatory steps in view of such assessment). Once the mobile device 110 has completed executing the file system operations and communicated the appropriate results back to the communications engine 240 (step 420), the communications engine 240 is able to modify the user content database 130 with any updates as communicated by the mobile device 110 (step 425). The web server 255 is then able to serve web pages to the user's web browser 250 that reflect an up-to-date view of what data is on the server as well as what data is on the mobile phone 110 as depicted in FIG. 3 (steps 430 and 435).

While the user makes various modifications to the data through the web browser 250, for example, as previously discussed in conjunction with FIG. 3 (step 440), the web server 255 tracks which corresponding mobile applications need updates and records the number and type of actions (e.g., add photo, add song, remove song from playlist, add a photo to an album, remove a song, remove a photos, etc.) needed to be performed on the mobile device 110 for such applications (step 445). Once the user has completed his session on the web browser 250, by referencing the application actions database 245, the communications engine 240 generates an aggregate list of file system operation instructions needed for each action made by the user during the web session (step 450). Depending upon the particular embodiment, the TCP connection established during the initial login process may be retained during the entire session or communications engine 240 may send another SMS message (with the IP address and a session identifier number as similarly used during the login process) to the thin client application 235 in order to establish another TCP connection (steps 455 to 460). Once the TCP connection is established, the communications engine 240 may transmit to the thin client application 235 the file system

operation instructions to be performed by the thin client application 235 on the mobile device's file system 210 in order to reflect the changes made by the user to the web browser 250 (step 465 to 470).

FIG. 5 illustrates an example of possible actions that can be made to a photo viewing application and the file system operations that need to be performed on the file system 210 of the mobile devices for such actions to take place. As shown in FIG. 5, the interaction of mobile applications with the mobile file system 210 may differ even if the action taken by the user on the web browser is the same, depending upon the application and the make and model of the mobile device. As shown in 500, there may be a number of actions that can be made by a user through a picture viewing application, such as adding a photo, removing a photo, adding a photo to an album, etc. A user may choose, for example, to add a photo stored in the user content database 130 to the mobile device 110 which corresponds to action 505 in FIG. 5. If the mobile device 110 is of a particular make and model "A" and utilizes a particular picture viewer application "A", adding a photo may simply require the communications engine 240 to transmit the photo to the thin client application 235 in order to perform one file system operation, namely, putting the photo file in the appropriate folder (see 510). In contrast, if the mobile device 110 is of a particular make and model "B" and utilizes a particular picture viewer application "B" (which utilizes an additional index file to keep track of photos on the mobile device), adding a photo may require the communications engine 240 to instruct the thin client application 235 to perform multiple file system operations as depicted in 515. Determination of which file system operations need to be performed for actions relating to a particular application on a particular mobile device may be done through reverse engineering techniques or in cooperation with the application provider or developer. For example, the developer of picture viewer application "B" for mobile device B in FIG. 5 may provide the server 120 a "plugin" that provides lists of the file system operations needed to be performed on the file system 210 of mobile device "B" for each of the actions listed in 500, including list 510. The content of such plugins may ultimately be stored in application actions database 245 for future access by the communications engine 240.

#### E. Enrollment Process

Prior to using the hosted mobile management services offered by server 120, a user possessing mobile device 110 may need to enroll with the server 120 through the server's web site. In one embodiment, enrollment may take place at the user's personal computer 125 that also locally stores user's pre-existing digital music library and photos. As depicted in FIG. 6, at step 600, web server 255 requests registration information from the user including, for example, a username, password, mobile phone number, make and model of the mobile device 110, carrier service provider, any custom applications installed on the mobile device 110, etc. At step 605, the web server 255 then creates a user account for the user based upon such registration information. The registration information may enable server 120 to determine what native and custom applications (215 and 220) are utilized on the mobile device 110, and therefore, at step 610, determine the appropriate lists of file system operation instructions stored in application actions database 245 to associate with the newly created user account. At step 615, the user may upload his user data such as his pre-existing digital music library (or portions thereof) and/or digital photos (or portions thereof) stored on his personal computer 125 to the server 120

11

and, at step 620, the server 120 stores the user's uploaded data in the user content database 130, associating such user data with the newly created account. Those with ordinary skill in the art will recognize that any index files, playlist files, album files, preference files, online music store and online photo site usernames and passwords and other music or photo management files relating to the pre-existing digital music library and photo library on the user's personal computer 125 may also be uploaded (and translated, to the extent such files are in proprietary formats of third party media applications such as iTunes) to the server 120 and/or the database 130. Similarly, those with ordinary skill in the art will recognize that other techniques of updating or accessing such user data may include accessing other web sites such as photo sharing or storing sites where the user's photos and other data may be centrally stored. At step 625, mobile device 110 may download and install the thin client application 235 from the server 125. Those with ordinary skill in the art will recognize that alternative methods of downloading the mobile device software module 500 may be utilized. For example, known methods using direct over-the-air ("OTA") download techniques may be utilized to download and install the thin client application 235 to the mobile device 110. In one such OTA technique, the server 125 may utilize the SMS gateway 135 to send to the mobile phone number of the mobile device 110 (as received in step 600) an SMS message containing a URL (Universal Resource Locator) to the file containing the thin client application 235 or to a web page containing a link to such a downloadable file. Once such an SMS message is received by the mobile device 110, the user may utilize the information in the SMS message to download (e.g., copy the URL address into the mobile device's 110 web browser in order to fetch the thin client application installation file) the thin client application 235. Alternatively, the web server 255 may simply provide such URL or other address information directly to the user through the web browser 250 and instruct the user to manually download the thin client application onto the mobile device 110 by manually entering the URL (or other address) into the web browser of the mobile device 110. In yet another scenario, the server 120 may request that the user couple the mobile device 110 to the personal computer 125, for example, through a USB connection, Bluetooth connection, WiFi connection or any other connection available between a mobile device 110 and the personal computer 125 known to those with ordinary skill in the art such that the thin client application may be downloaded to the personal computer 125 and subsequently transferred to the mobile device 110 through such connection. Once the thin client application 235 is downloaded and installed onto the mobile device 110, if the mobile device 110 contains a pre-existing user data, the communications engine 240 may communicate with the thin client application 235 to obtain such data and reconcile it with the data obtained through step 615 (step 630). The steps in such communication would be similar to steps 405 to 430 in FIG. 4. Once the end user has completed the enrollment process with the hosted mobile management service, he will subsequently be able to log into the server 120 from any online terminal and manage his user data on the mobile device 110 through the server's 120 web site.

#### F. Personal Computer Software Module

In one embodiment of the present invention, during the enrollment process as described in FIG. 6, the server 120 may also transmit for installation a software module to the user's personal computer 125 in order to monitor actions taken by the user through desktop applications or other web sites. Such

12

a downloaded software module may assist the user to maintain consistency between user data stored on personal computer 125 and on server 120. For example, the user may utilize a desktop music management tool such as iTunes on his personal computer 125 to modify the contents and organization of his locally stored music library (e.g., add a song, delete a song, purchase a song, modify a playlist, add a song to a playlist, remove a song from a playlist, etc.). In such instances, the downloaded software module may recognize such modifications, for example, by recognizing an updated timestamp made to the iTunes index file and may initiate a TCP connection with the server 120 to communicate such modifications to the server 120. For example, if the user purchased a new song through iTunes, the downloaded software module may transmit the newly purchased song to the server 120 for storage in the user content database 130. Similarly, if the user downloads to his personal computer 125 a set of digital photos from a third party photo sharing web site or from a received email attachment, the downloaded software module may recognize the addition of such new photos to the user's local photo storage folder and propagate such photos to the user content database 130 on the server 120. Those with ordinary skill in the art will recognize that different embodiments of the downloaded software module may also respond to communications initiated by the server 120 in order to propagate changes to the user content database 130 made by end user through the web browser 250 to the user's local data store. For example, the server 120 may transmit playcount, purchased music, and playlist modifications to the downloaded software module in order to update the library, playlist and playcounts of the user's local iTunes desktop application.

#### G. Alternative Embodiments

While the present invention has been primarily described with music and photos as the main media that are managed by the mobile management service hosted by server 120, those of ordinary skill in the art will recognize that alternative media and embodiments may be implemented without departing from the spirit and scope of the claimed invention. As previously discussed, other forms of mobile media and data such as video, ringtones, images, wallpaper, mobile games, email, and PIM information may also be managed through a web-enabled server in accordance with the techniques described herein. Although the present invention has been described with reference to alternative embodiments, those of ordinary skill in the art will recognize that changes may be made in form and detail without departing from the spirit and scope of this disclosure. For example, rather than being a primarily passive application that interacts with the file system 210 only upon instructions received from the communication engine 240, an embodiment of the thin client application 235 may be configured to also initiate communications with the communication engine 240 upon actions initiated by the user on the mobile device 110. For example, purchase of content such as songs through the mobile device 110 (e.g., mobile device's web browser) may cause the thin client application 235 to immediately transmit a copy of the purchased song to the server 120 for update (i.e., rather than waiting for a server initiated login process as detailed in FIG. 4 to recognize and reconcile such additions). Similarly, any changes made by the end user on the mobile device 110 to any of the playlists on the mobile device can also be communicated to the hosted mobile management service 130 in a similar fashion. Similarly, as described in some of the further alternative embodiments below, a thin client application 235 may offer more functionality (e.g., launching applications,

13

installing games, ringtones and wallpaper, remotely controlling applications, etc.) than interacting through file system operations. Such thin client applications may be more tightly integrated with the operating system 205 of the mobile device and/or the mobile applications on the mobile device (e.g., through APIs provided by the mobile applications, etc.).

In one alternative embodiment, mobile devices that are not focused on communication, such as digital cameras and portable music players, may be enabled with SMS and IP-based cellular networking capabilities. The thin client application 235 may be installed on such mobile devices such that content may be added to or removed from such mobile devices through the server 120 in a convenient fashion. For example, photos taken by a digital camera may be easily transmitted to the user's account at the server 120 or songs purchased online may be easily transmitted to the portable music player through the server 120. Similarly, cellular network enabled automobiles may also install the thin client application 235 such that songs may be added or removed from a media store accessible by the stereo of the automobile.

In another embodiment, the server 120 may facilitate the sharing of content on mobile devices among friends. In such an embodiment, an owner of a mobile device may, through enhanced functionalities provided by the web site of the server 120, allocate a certain amount of memory on the mobile device to be controlled and accessed by his friends. Such friends would have the freedom and capability to add content to their allocated memory space on the owner's mobile device by utilizing the capabilities of the server 120 and thin client application 235 at their convenience. The owner would access and view such content, in turn, at his own convenience. For example, a friend may desire to purchase a song as a gift for the owner of the mobile device through the web site of the server 120. Once the friend successfully purchases the song, server 120 may store the song in user content database 130 under the account of the owner of the mobile device. The communications engine 240 may then initiate a communication session with the thin client application 235 similar to steps 455 through 470 of FIG. 4 to transmit the song to the owner's mobile device. The song may be stored in a memory space of the mobile device that has been specifically allocated by the owner to the friend. The owner may then be able to claim the song, for example, by logging into the web server 255 and accepting the gift, whereby the thin client application 235 then moves the song from the friend's memory space to the correct folder utilized by the mobile device's music player application (or otherwise modifies the index file of the mobile device's music player application to recognize the location on the file system of the added song). Those with ordinary skill in the art will recognize a variety of different functionalities and business models consistent with the spirit of the foregoing sharing embodiment. For example, the owner of the mobile device may also allocate memory space on the mobile device for specific advertisers to add content to the mobile phone. The advertiser may add and remove packages of content (e.g., ringtones, images, wallpaper, songs, videos, etc.) at its convenience to its allocated memory space through the thin client application 235 which the owner of the mobile device may view or consume at his own convenience. From a business model perspective, the advertiser may pay the owner of the mobile device for the right to use "lease" space on the owner's mobile phone and so long as the advertiser sees that the owner continues to view or consume the content provided by the advertiser to the owner's mobile device, the advertiser may find it worthwhile to continue leasing such space and adding new content.

14

Another embodiment may offer the capability to control the real-time playing of music on the mobile device by redirecting music playing commands from the web browser 250 through the web server 255 and to the mobile device 110. Such an embodiment may be utilized in an environment where the mobile device 110 may be coupled to external speakers in order to play the music residing in the mobile device to a larger audience. The thin client application 235 in such an embodiment may have the capability to launch the music player application on the mobile device 110 pursuant to instructions transmitted to it by the communications engine 240. The user is then able to control the mobile music player through the web browser 250 by propagating playing directions (e.g., play, next track, previous track, fast forward, rewind, etc.) to the thin client application 235.

Those of ordinary skill in the art will additionally recognize that the control logic and data stored and used by the various software components as described in the foregoing specification are merely illustrative and may be redistributed various other software components and databases in alternative but functionally equivalent designs, including the removal of certain software components and/or databases, without departing from the scope or spirit of the described embodiments. For example and without limitation, the present invention has been described using TCP/IP based connections, but those of ordinary skill in the art will recognize that other packet based protocols, either on layered on top of TCP/IP, such as HTTP, or as an alternative to TCP/IP may also be used to establish data transfer sessions. Terminology used in the foregoing description is for the purpose of describing the particular versions or embodiments only, and is not intended to limit the scope of the present invention which will be limited only by the appended claims. As used herein and in the appended claims, the singular forms "a," "an," and "the" include plural references unless the context clearly dictates otherwise. Similarly, the words "for example," "such as," "include," "includes" and "including" when used herein shall be deemed in each case to be followed by the words "without limitation." Unless defined otherwise herein, all technical and scientific terms used herein have the same meanings as commonly understood by one of ordinary skill in the art. All publications mentioned herein are incorporated by reference. Nothing herein is to be construed as an admission that the embodiments disclosed herein are not entitled to antedate such disclosure by virtue of prior invention. Thus, various modifications, additions and substitutions and the like can be made without departing from the spirit of the invention and these are therefore considered to be within the scope of the invention as defined in the following claims.

What is claimed is:

1. A method for remotely causing a mobile device to implement an action, the method comprising:
  - receiving, at a server from a terminal, an indication of user input representing the action, wherein the terminal is separate from the server and separate from the mobile device;
  - responsive to receiving the indication of user input representing the action to be implemented on the mobile device, transmitting a message from the server to the mobile device that causes the mobile device to automatically send a request to establish a network connection to the server;
  - receiving, at the server, the request from the mobile device to establish the network connection;
  - establishing the network connection between the mobile device and the server; and

15

transmitting instructions from the server through the network connection that cause the mobile device to implement the action on the mobile device, wherein the action on the mobile device is at least one of moving data to the mobile device, moving data from the mobile device, deleting data from the mobile device, copying data on to the mobile device, moving data within a directory structure of the mobile device, or renaming a file on the mobile device.

2. The method of claim 1, wherein the indication comprises a manipulation of a user interface of a desktop application or of a web site.

3. The method of claim 2, wherein the user interface simulates the mobile device so that a user of the user interface views or hears modifications to the mobile device represented by the action prior to transmitting the instructions to implement the action.

4. The method of claim 1, wherein the action relates to instructions for playing digital music on the mobile device.

5. The method of claim 1, wherein the message is a push message that is processed by a push registry of the mobile device to cause the mobile device to automatically send the request.

6. The method of claim 1, wherein the action comprises storing media content received through the network connection in a folder structure of a file system of the mobile device.

7. The method of claim 1, wherein the instructions comprise at least one instruction corresponding to at least one file system operation.

8. The method of claim 1, wherein the action comprises a data management action at the terminal and the instructions correspond to the data management action.

9. The method of claim 1, wherein the message comprises a short message service (SMS) message and the network connection comprises a TCP/IP connection.

10. The method of claim 1, wherein transmitting the message comprises transmitting to a specified port number of the mobile device on which the mobile device is configured to listen.

11. The method of claim 1, wherein the message is associated with a network address of the server and the network address of the server is used by the mobile device to transmit the request to establish the network connection.

12. A non-transitory computer-readable storage medium including instructions that, when executed by a processor of a server, cause the server to:

receive an indication that was generated in response to user input at a terminal separate from a mobile device and separate from the server, the indication representing an action to be implemented on the mobile device;

in response to receipt of the indication representing the action to be implemented on the mobile device, transmit a message to the mobile device to cause the mobile device to automatically send a request to establish a network connection with the server;

receive the request from the mobile device to establish the network connection;

in response to receipt of the request, establish the network connection between the server and the mobile device; and

transmit instructions through the network connection to the mobile device that cause the mobile device to implement the action, wherein the instructions regarding the action comprise at least one instruction to implement at least one file system operation and the file system operation comprises at least one of an operation to put file/folder, an operation to get a file/folder timestamp, an operation

16

to get a file/folder size, an operation to add a file, an operation to delete a file/folder, an operation to replace a file/folder, an operation to copy a file, an operation to move a file/folder, or an operation to rename a file/folder.

13. The non-transitory computer-readable storage medium of claim 12, wherein the action relates to instructions that control real-time playing of digital music on the mobile device.

14. The non-transitory computer-readable storage medium of claim 12, wherein the instructions regarding the action comprise at least one file system operation that, when performed by the mobile device, results in the mobile device storing media content received through the network connection in a specified location on a file system of the mobile device.

15. The non-transitory computer-readable storage medium of claim 12, wherein the message is transmitted on an out of band channel.

16. The non-transitory computer-readable storage medium of claim 12, wherein the indication comprises a plurality of indications aggregated by the terminal.

17. The non-transitory computer-readable storage medium of claim 12, wherein the indication comprises a single indication received from the terminal in real time.

18. The non-transitory computer-readable storage medium of claim 12, wherein the message is associated with a network address of the server and the network address is used by the mobile device to transmit the request to establish the network connection.

19. The non-transitory computer-readable storage medium of claim 12, wherein the message is a push message that is processed by a push registry of the mobile device to cause the mobile device to automatically send the request.

20. A server configured to synchronize a terminal and a mobile device, the server comprising a processor configured to:

receive, from the terminal which is separate from the mobile device, an indication generated in response to input by a user representing an action to be carried out on the mobile device;

in response to receipt by the server of the indication representing the action to be carried out on the mobile device, transmit a message to the mobile device to cause the mobile device to automatically send a request to the server to establish a network connection;

receive the request;

responsive to receiving the request, establish the network connection between the server and the mobile device; and

transmit operation instructions for the mobile device to carry out the action represented by the user indication, wherein the action on the mobile device is at least one of moving data to the mobile device, moving data from the mobile device, deleting data from the mobile device, copying data on to the mobile device, moving data within a directory structure of the mobile device, or renaming a file on the mobile device.

21. The server of claim 20, wherein the message is associated with a session identifier that is used by the server to keep track of a particular communication session.

22. The server of claim 20, wherein the operation instructions comprise at least one instruction to implement at least one file system operation.

23. The server of claim 20, further comprising an applications actions database coupled to the processor and configured to maintain a list of operation instructions for the mobile device for indications that can be generated on the terminal.

24. The server of claim 20, further comprising a plugin specific to an application on the mobile device that provides operation instructions for the application that correspond to the indication.

25. The server of claim 20, further comprising a content database coupled to the processor and configured to provide network storage of content. 5

26. The server of claim 20, further comprising a content database coupled to the processor and configured to store a make and a model of the mobile device and a list of applications on the mobile device. 10

27. The server of claim 20, further comprising a web server coupled to the processor and configured to generate a user interface, wherein the user interface comprises an interface for the user to manage data on the mobile device. 15

28. The server of claim 20, wherein the processor is further configured to request a timestamp from the mobile device, compare the timestamp with a timestamp known by the server, and if the timestamps differ, request a directory listing from the mobile device. 20

29. The server of claim 20, wherein the message is associated with a network address of the server and the network address of the server is used by the mobile device to transmit the request to establish the network connection.

30. The server of claim 20, wherein the message is a push message that is processed by a push registry of the mobile device to cause the mobile device to automatically send the request. 25

\* \* \* \* \*